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CONFLUENCE

DATA REPORT

1988-1990

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CONFLUENCE 1988-1990

DATA REPORT

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LDGO-91-2
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PALISADES, N.Y. 10964
1991

INTRODUCTION

The Confluence Program is a joint US, Argentine and French effort to study the dynamics of southwestern Atlantic Ocean in the area of the confluence between the Brazil and Malvinas Currents. An extensive field experiment was organized and three cruises were completed during the years 1988 to 1990. Throughout these cruises, each during a different austral season, the following work was completed:

- CONFLUENCE 1988 (November 1988): Ten (10) inverted echo sounders (IES), four (4) of which were equipped with an ambient noise capability (NSL), and three (3) current meter moorings were deployed. A hydrographic survey of the area was performed.
- CONFLUENCE 1989 (September 1989): A regional hydrographic survey was repeated to provide an intermediate realization of the water column properties between deployment and recovery of the moored instruments.
- CONFLUENCE 1990 (February 1990): The moored instruments were recovered and a third realization of the hydrographic field was obtained.

The US component of the field program consisted of the deployment of 10 IES and expendable bathythermograph (XBT) measurements to support the hydrographic work during the three cruises. The program was funded by the Division of Ocean Science of the National Science Foundation. The hydrographic data collected during the first two cruises, the CTD measurements obtained by the Argentine scientists, as well as the XBT data have been published by Charo *et al* (1991). This report presents the data collected with the IES and NSL, as well as the XBT survey obtained during the third cruise. A complete description of the scientific objectives of the program, data gathered and participants is given by Garzoli *et al*, 1990.

Inverted Echo Sounders (IES)

The inverted echo sounders are bottom-deployed instruments that internally record the time it takes an acoustic signal to travel to the surface, reflect and return. It has been demonstrated (Watts and Rossby, 1977) that this time, called travel time, can be scaled to the dynamic height of the ocean. In order to do this, a relation must be obtained between the two parameters (travel time and dynamic height) and this relation is particular for each oceanic region. Examples of this calibration for the southwestern Atlantic can be obtained from Garzoli

and Bianchi (1987) and Garzoli and Garraffo (1989). The location of the 10 IES deployments is given in Figure 1.

In addition to travel time, four of the ten IES were equipped with ambient noise capability to register the noise in the water column. This noise has been proven (Lemon *et al*, 1984) to be related to the magnitude of the wind (**W**), or the stress of the wind at the surface through a relation of the equation $20 \log \mathbf{W} = \mathbf{a}\,\mathrm{NSL} + \mathbf{b}$. Values for the constants **a** and **b** for the southwestern Atlantic were calculated by Garzoli and Clements (1986).

Expendable Bathythermographs (XBT)

Twenty-nine expendable bathythermographs (XBT) were launched during the second leg of the Confluence 1990 cruise aboard the R/V Le Suroit (IFREMER, France). Table 2 shows the location, date, time and sea surface temperature for each record. Location of the launchings is also presented in Figure 2.

Data acquisition was performed aboard by means of a personal computer standard software. No significant differences in sea surface temperatures (recorded with a continuous recorder installed at 3m depth in the ship), compared with recorded XBT temperatures, were obtained. The mean difference (ΔT) was 0.06°C. Due to the fact that CTD data were not furnished for comparison, no calibration was applied to the temperature profiles presented here.

Finally, using specially designed graphic software, spurious temperature spikes were removed from the profiles presented in this section.

Data Report

The report consists of three parts:

Part I: Travel time series and spectra

In this part, the travel time data collected with the inverted echo sounders is presented as follows:

- Figure 1: A map showing the location of the moored sites;

- Table 1: The table shows the coordinates and depth of the deployments and the dates of deployment and recovery; and
- Ten time series of travel time and power density spectra of the series.

The observations cover the period from November 1988 through February 1990. The interval between observations is one hour. The spectral analysis estimates are the result of the running mean of nine adjacent frequency bands.

Part II: Ambient noise series and spectra

The second part presents the data collected with the NSL cards. Even though four cards were deployed with the sounders (see Figure 1), data from only three are presented. The fourth card presented calibration problems and has been sent back to the manufacturer. Recovery of the data is expected.

Data is presented as:

- Three time series of ambient noise;
- Power density and variance preserving spectra.

The interval between observations, the time span, and the spectral analysis is the same as described for travel time.

Part III: XBT data from the Confluence 1990 cruise

The third part shows the XBT temperature profiles collected during the Confluence 1990 cruise, February 1990. Data is presented as follows:

- Figure 2: location of the Confluence 1990 XBT launches;
- Table 2: coordinates and date of the launches;
- Plots of the vertical profiles of temperature as a function of depth; and
- Table 3: measured values of temperature as a function of selected depths.

Acknowledgements

The engineer in charge of the IES was Miguel Macció. He was assisted in the deployment and recovery cruises by Mario Ferrario who, during Confluence 1989, performed the "listening" of each instrument to verify its performance. Data reduction (TT and NSL) was done by Mark Edwards. Anthony Martino performed the graphics and spectral analysis of the series. Susan Brower compiled and design the report. The Confluence 1988 and 1989 cruises were performed from the Argentine R/V ARA PUERTO DESEADO and Confluence 1990 from the French R/V LE SUROIT. We are indebted to their crews for their cooperation and technical support. We thank the Governments of Argentina and Uruguay for granting permission to work in their territorial waters. The data was collected under NSF grant OCE-87-11529. Further collaboration between scientists of Argentina and US was supported by grant INT-89-14536 of the International Division of the National Science Foundation and grant CU00327801 from the Tinker Foundation. This is a Lamont-Doherty Geological Observatory Publication #91-2.

References

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Travel Time Series
and
Power Density Spectra

IES DEPLOYMENTS

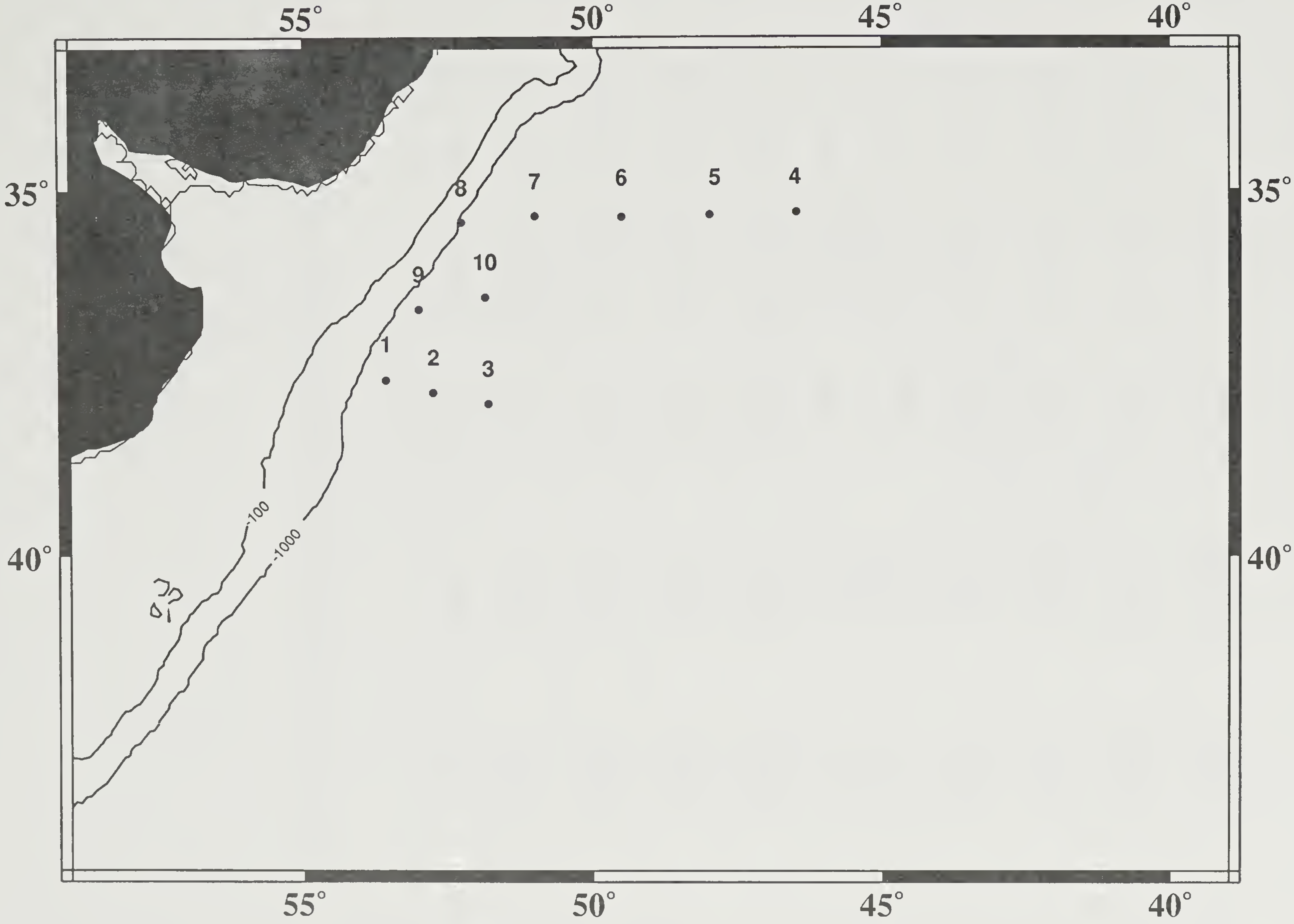
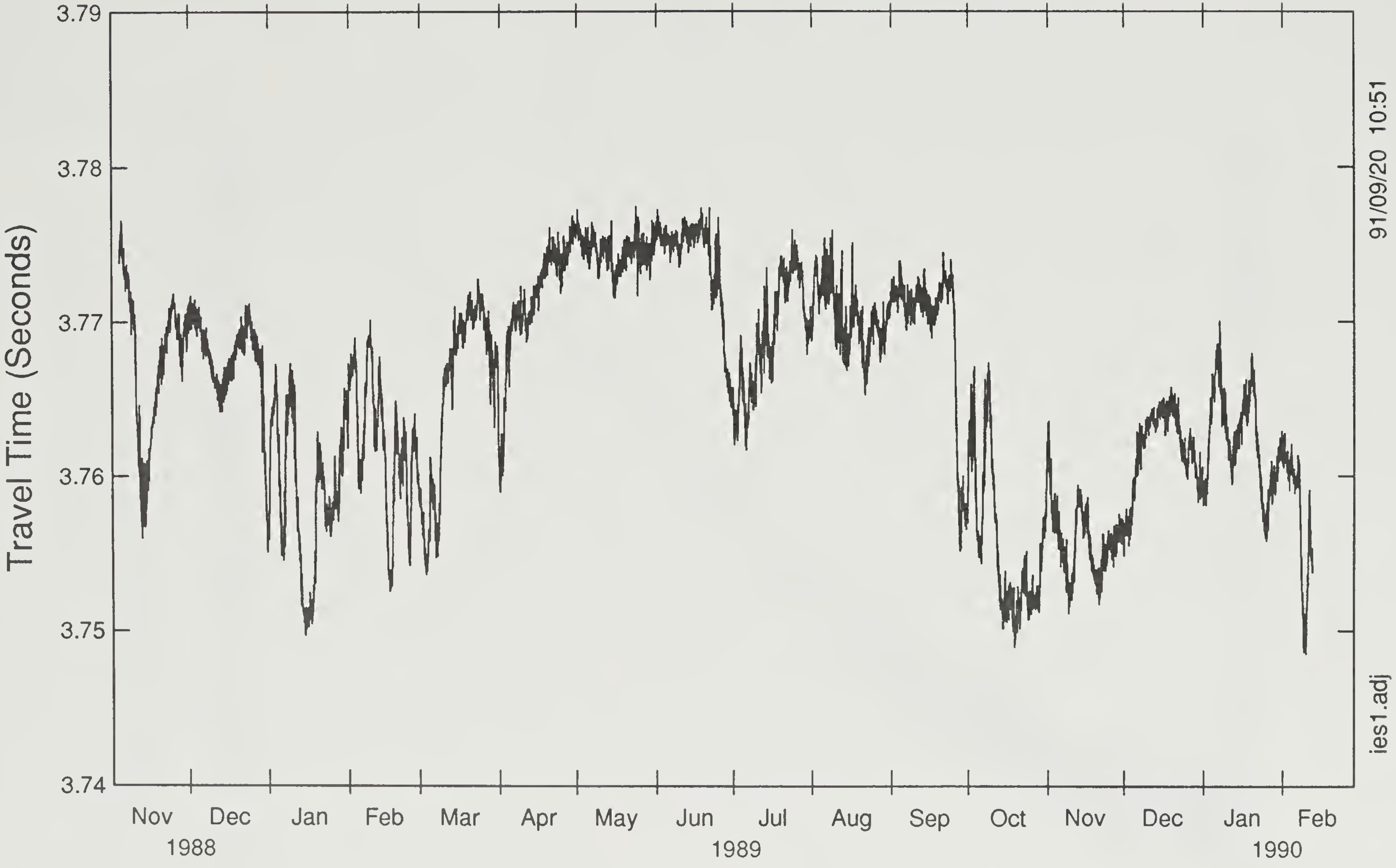


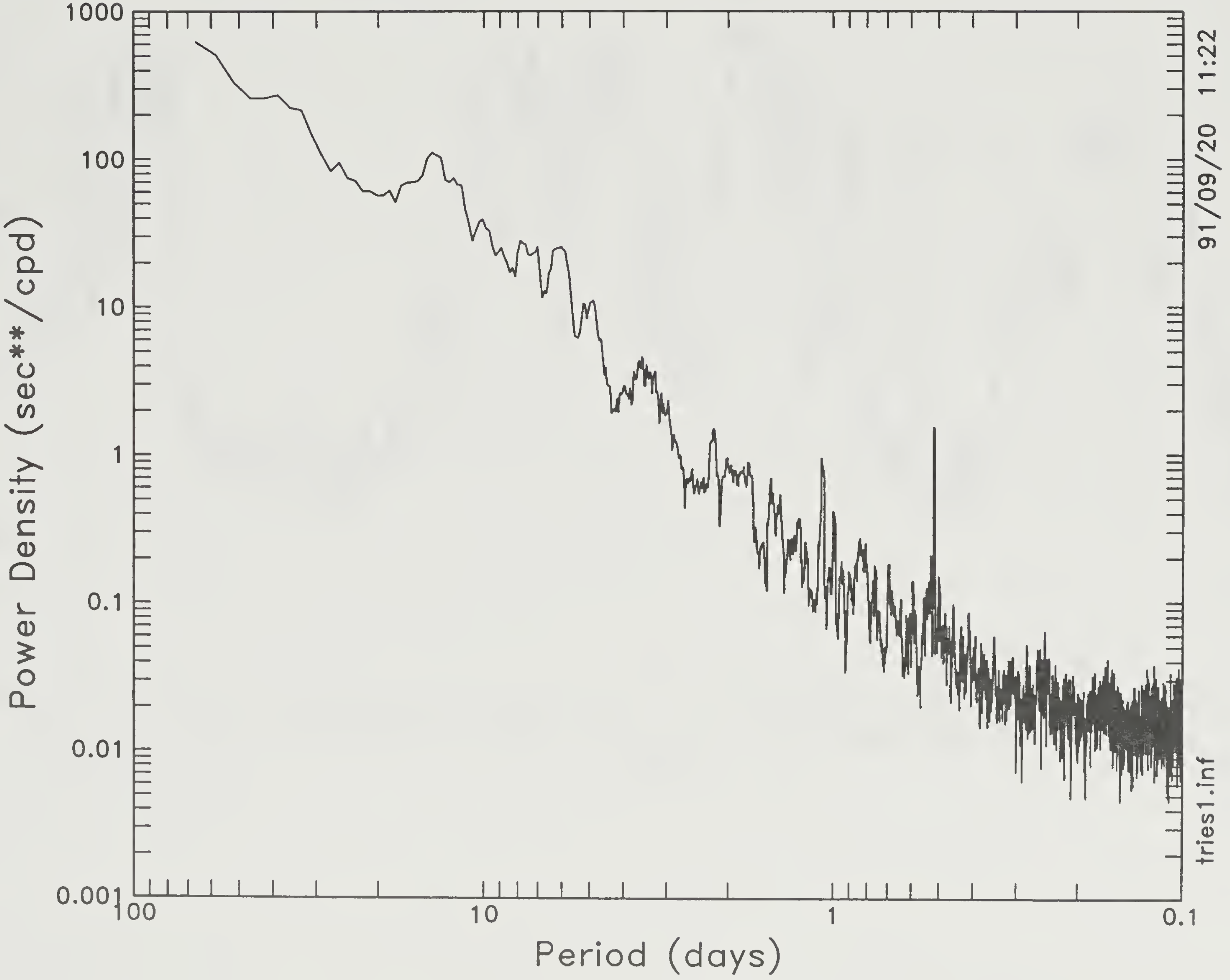
TABLE I

IES Site #	LAT	LONG	Depth(m)	Deployment Date	Recovery Date
1	37°37.64'S	53°34.11'W	2852 m	11/14/88	2/23/90
2	37°48.10'S	52°45.20'W	3804 m	11/4/88	2/23/90
3	37°57.42'S	51°53.47'W	4346 m	11/5/88	2/24/90
4	35°19.00'S	46°29.00'W	4824 m	11/8/88	2/19/90
5	35°21.18'S	47°59.08'W	4688	11/9/88	2/19/90
6	35°22.90'S	49°30.40'W	4247 m	11/10/88	2/18/90
7	35°21.89'S	51°00.40W	3018 m	11/10/88	2/17/90
8	35°27.39'S	52°16.94'W	1327 m	11/12/88	2/17/90
9	36°39.54'S	53°00.39'W	2231 m	11/13/88	2/21/90
10	36°29.56'S	51°52.35'W	3307 m	11/12/88	2/21/90

Location of the IES sites (LAT, LONG), depth, and dates of deployment and recovery are given.

Ies #1
Travel Time

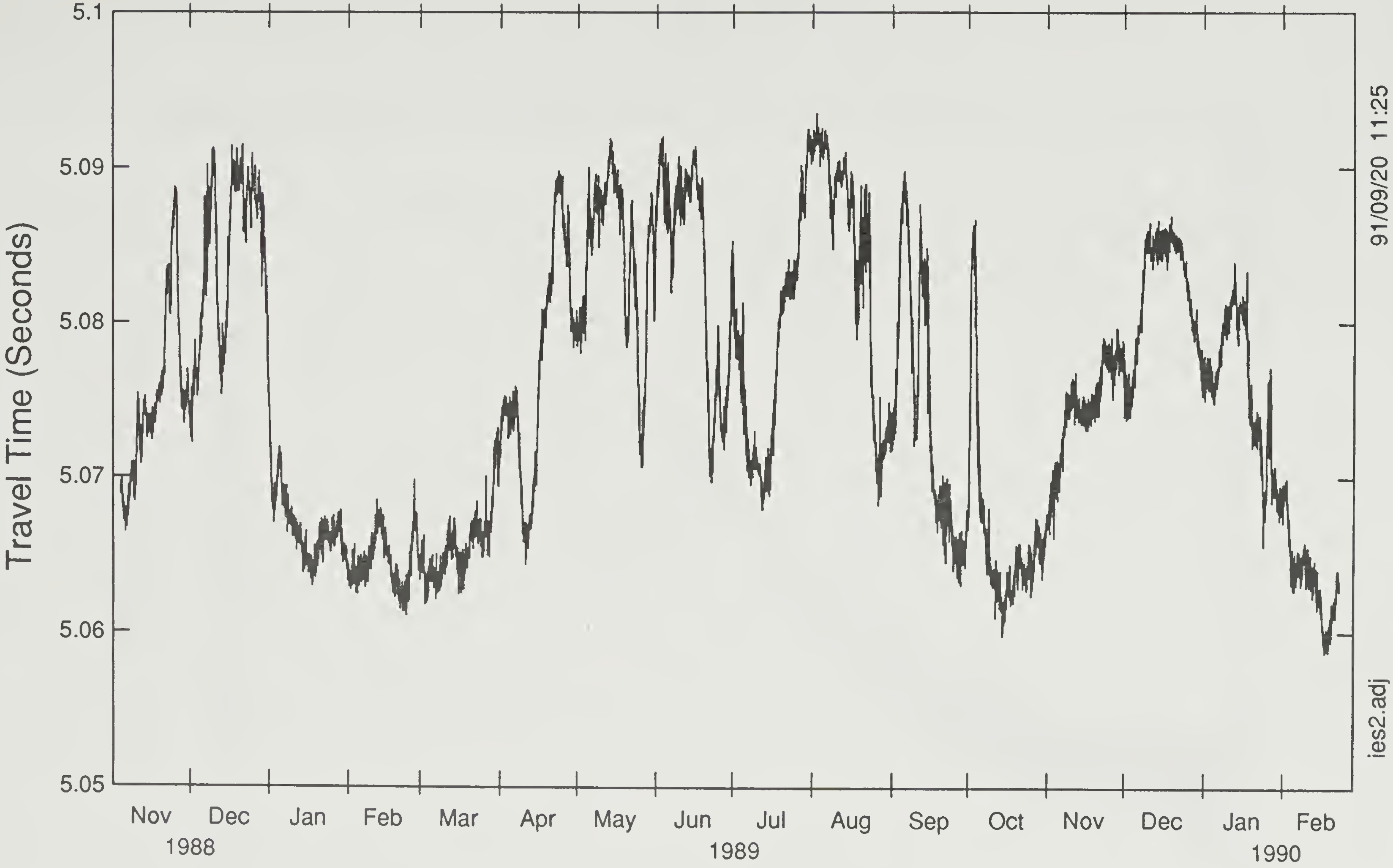


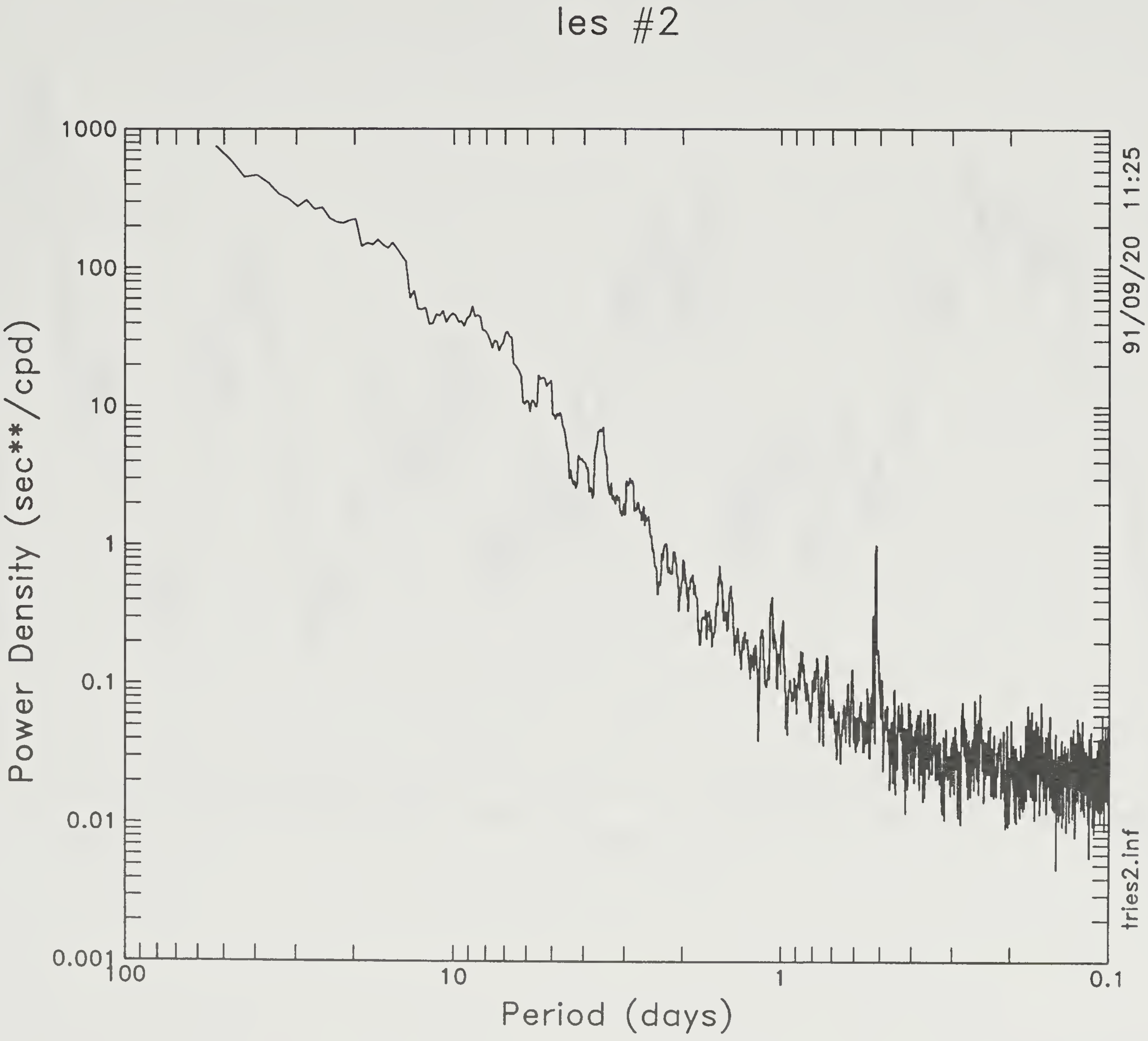


les #1

Power Density (sec**/cpd)
1000
100
10
1
0.1
0.01
0.001
Period (days)
100
10
1
0.1
91/09/20 11:22
tries1.inf

Ies #2
Travel Time

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Power Density (sec**/cpd)
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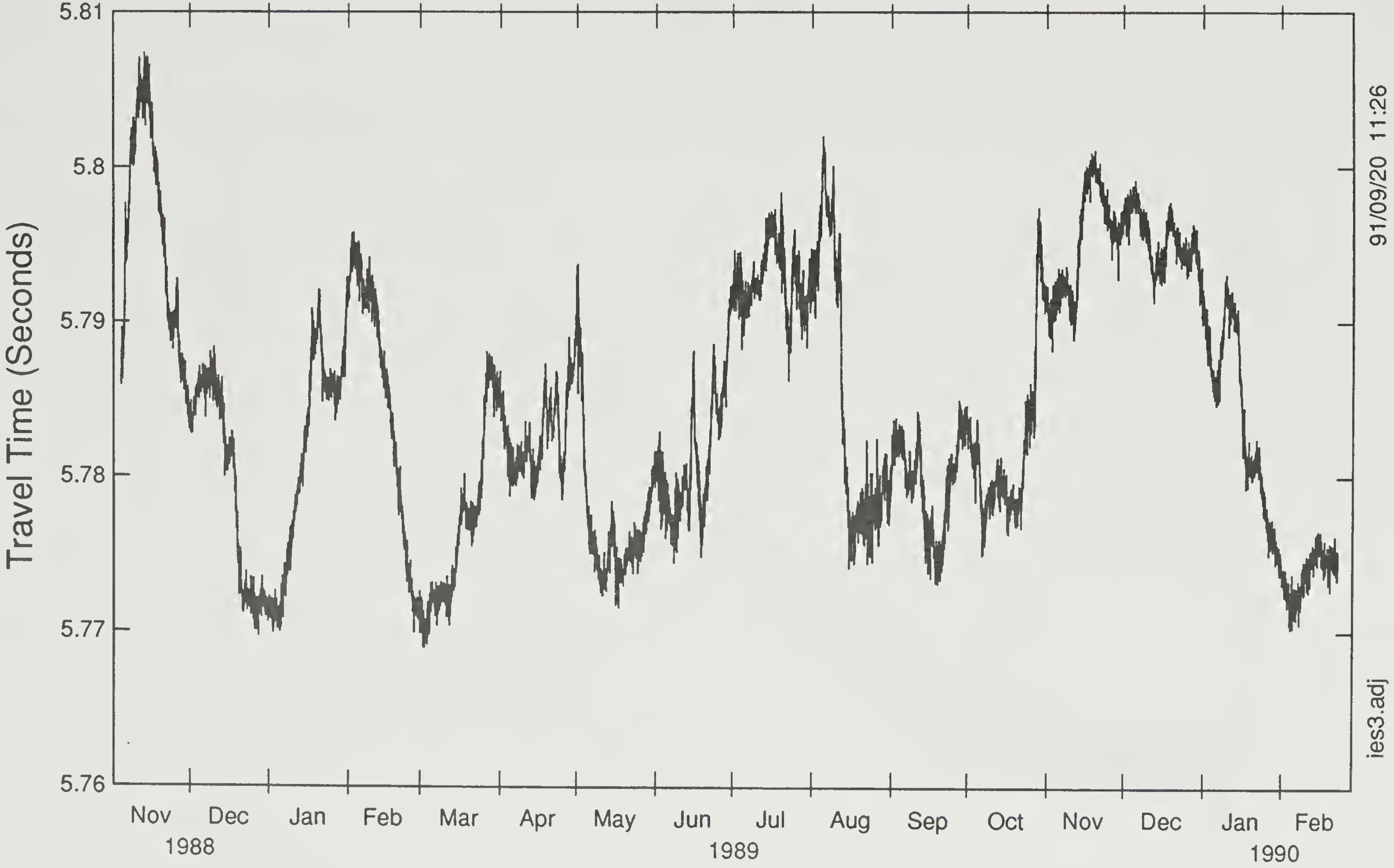
100
10
1
0.1
Period (days)
91/09/20 11:25
tries2.inf



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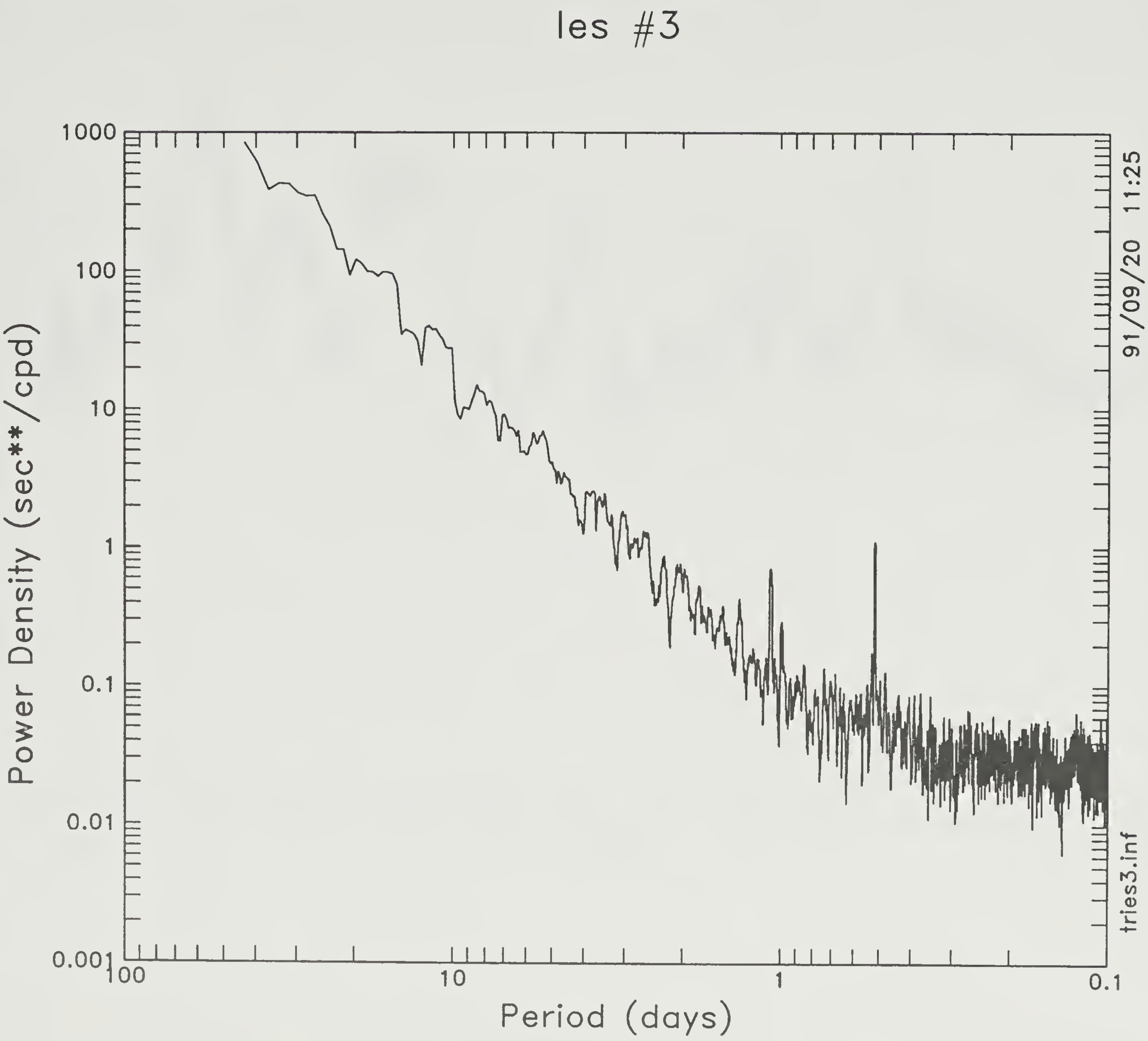
Travel Time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10
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0.1
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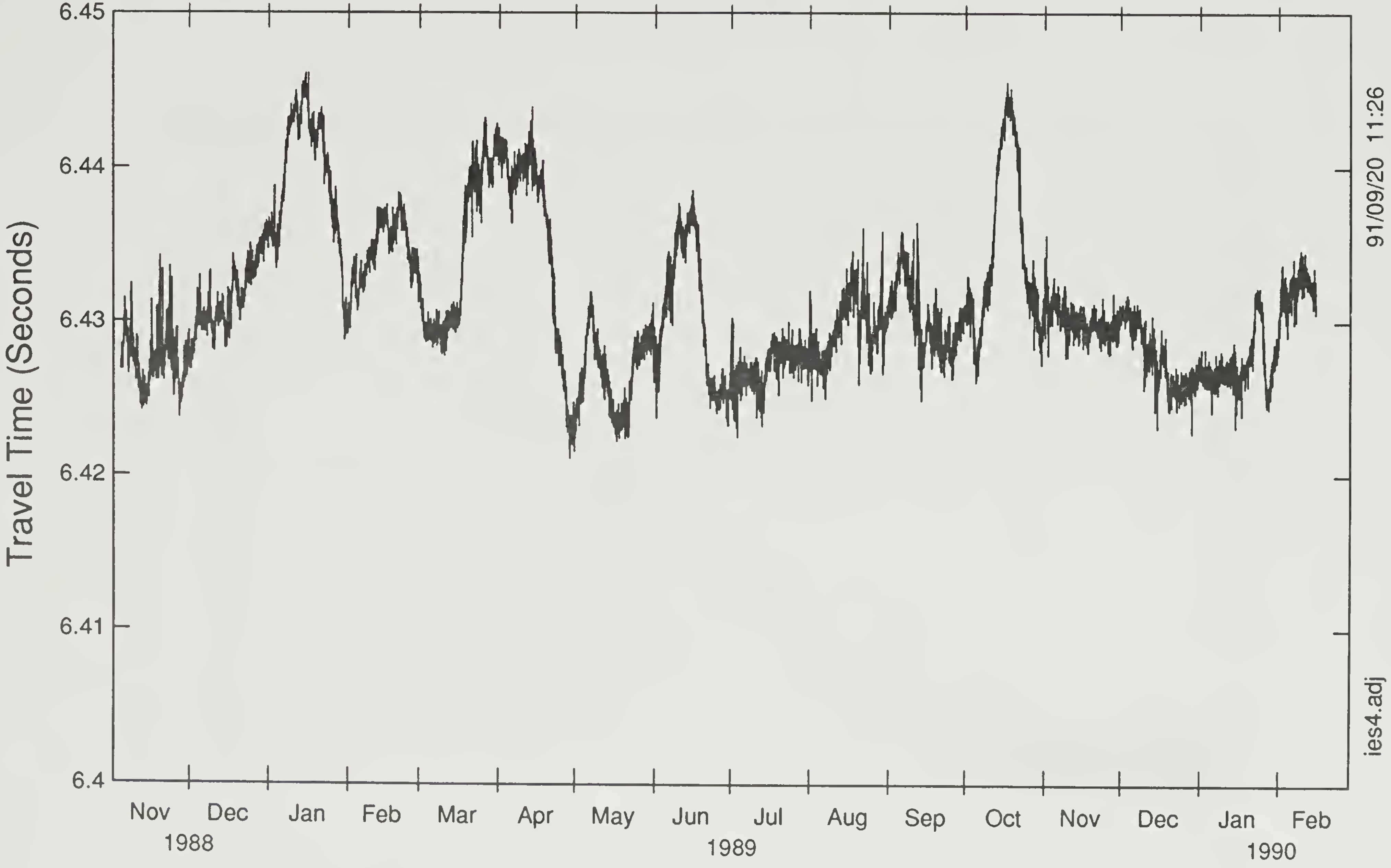
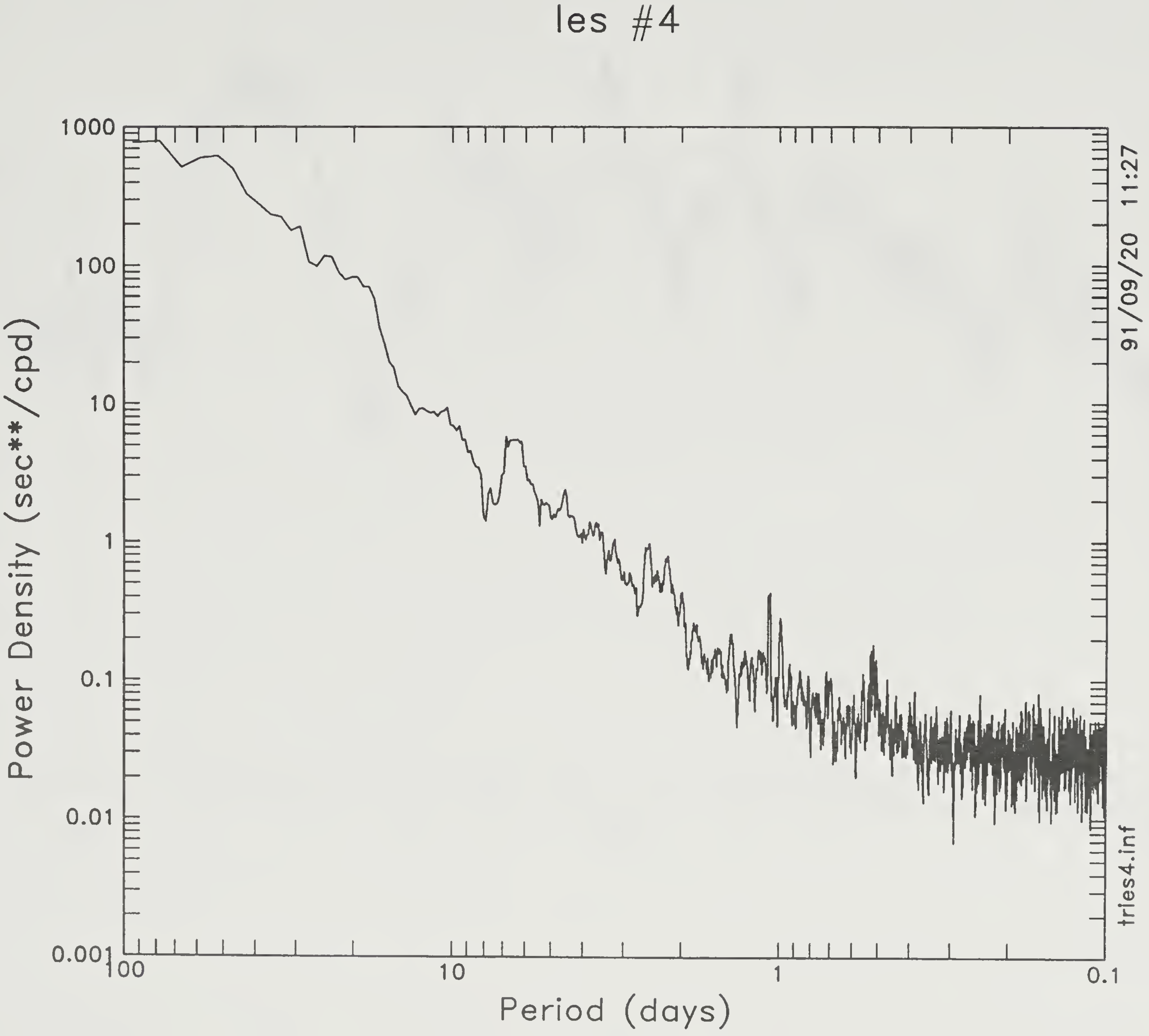
Ies #4
Travel Time

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91/09/20 11:27
tries4.inf
Power Density (sec**/cpd)
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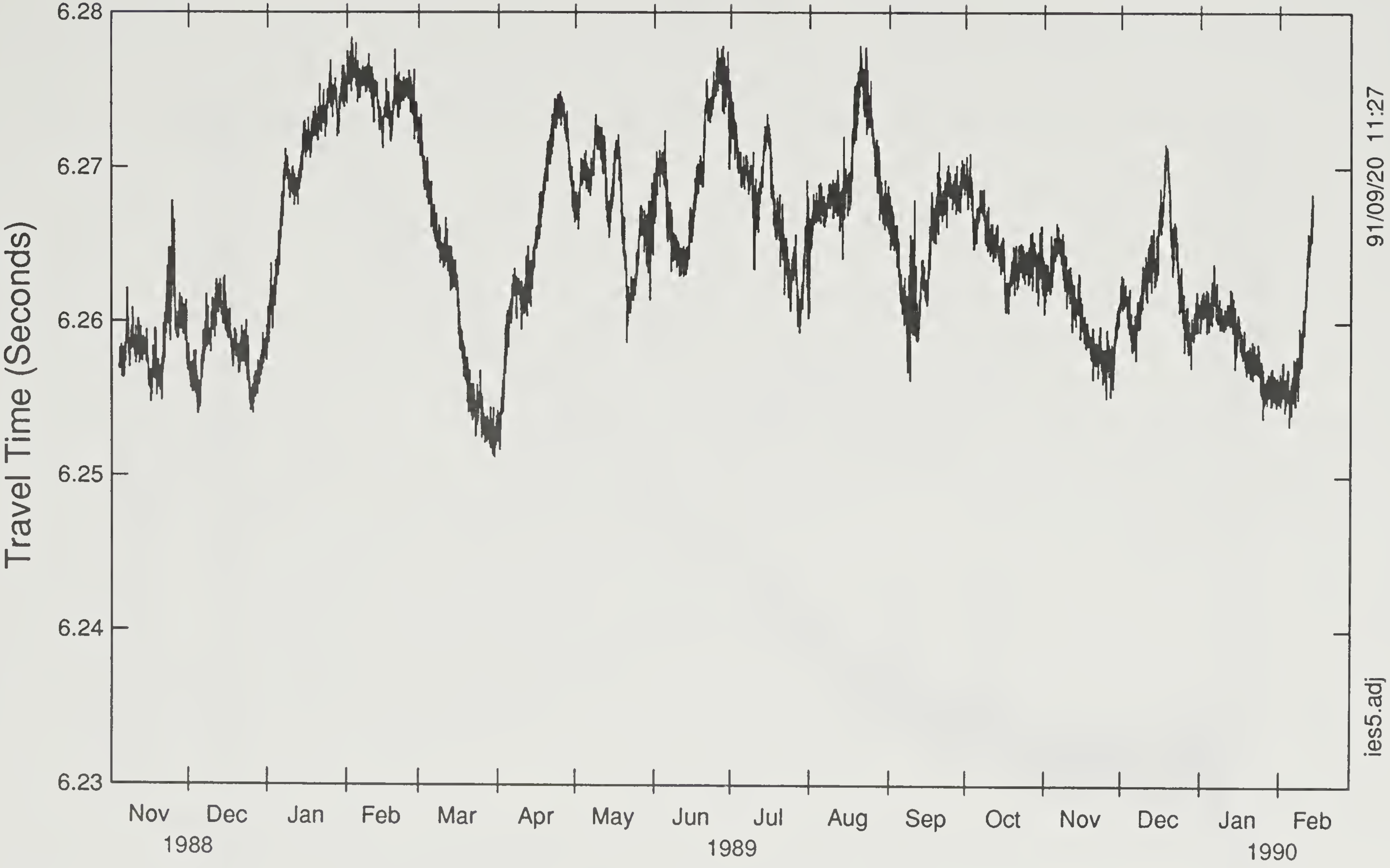
0.01
0.001
100
10
1
0.1
Period (days)

Ies #5
Travel Time



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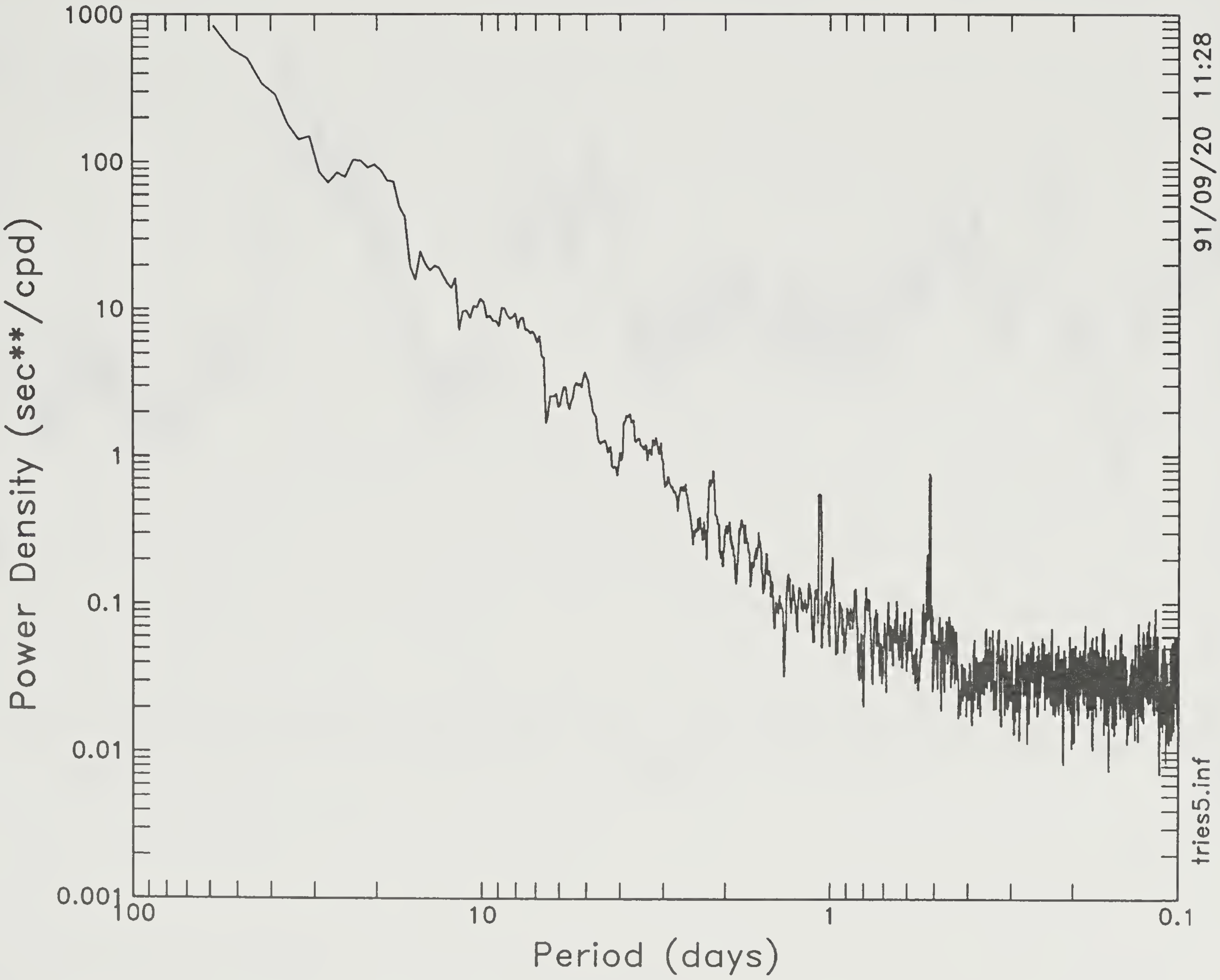
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10
1
0.1
0.01
0.001
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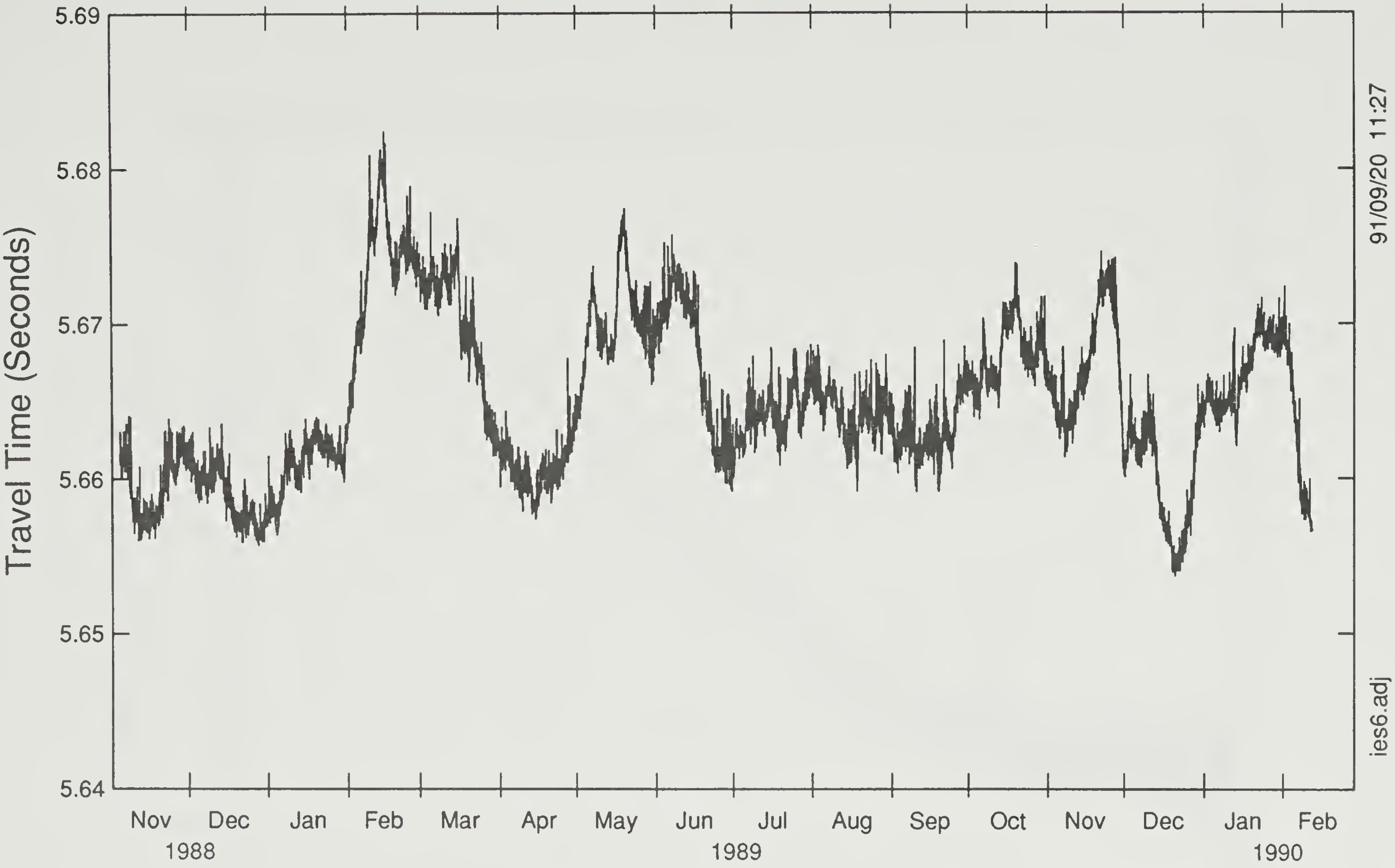
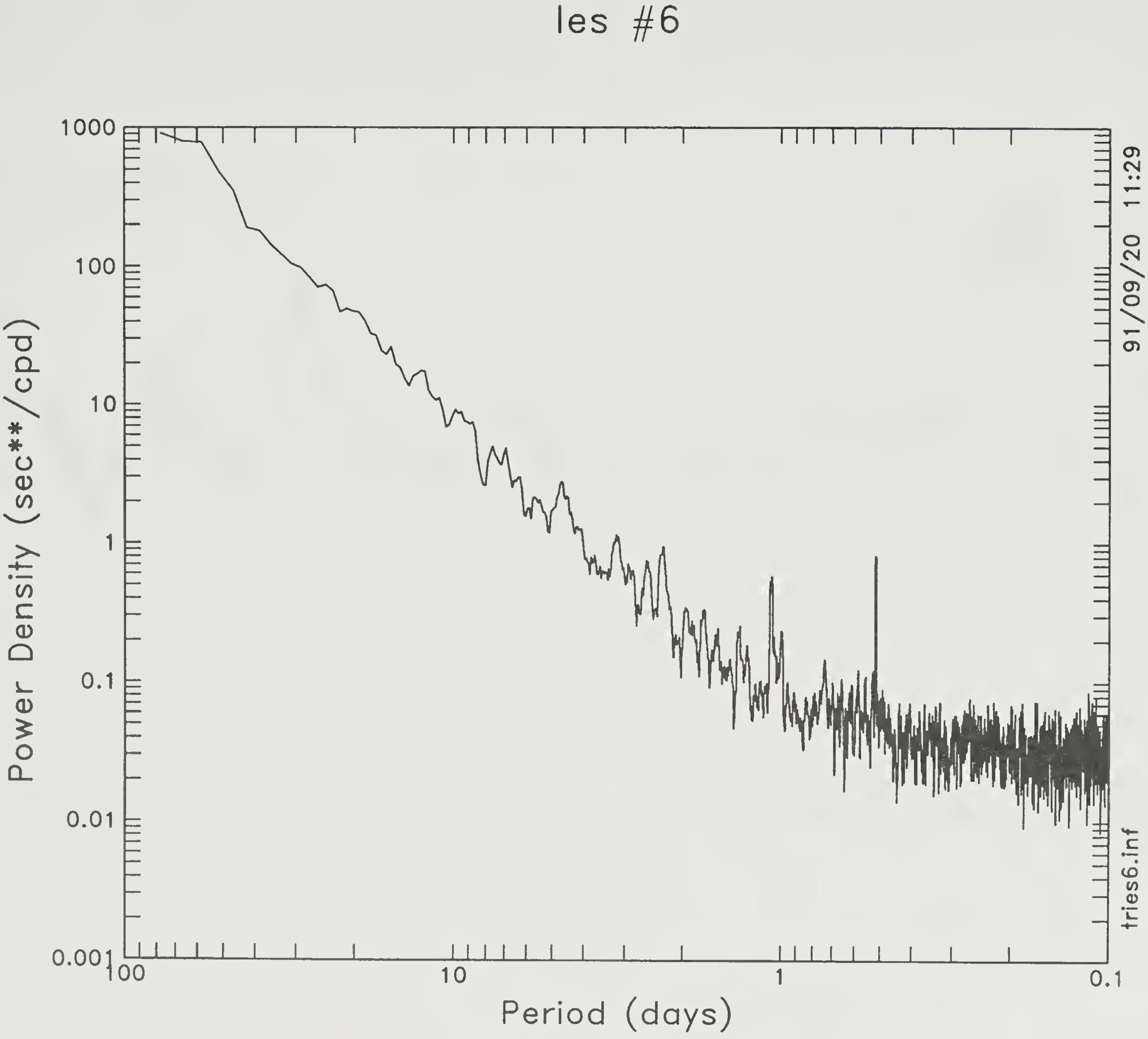
Period (days)
91/09/20 11:28
tries5.inf

Ies #6
Travel Time

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0.01
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0.1
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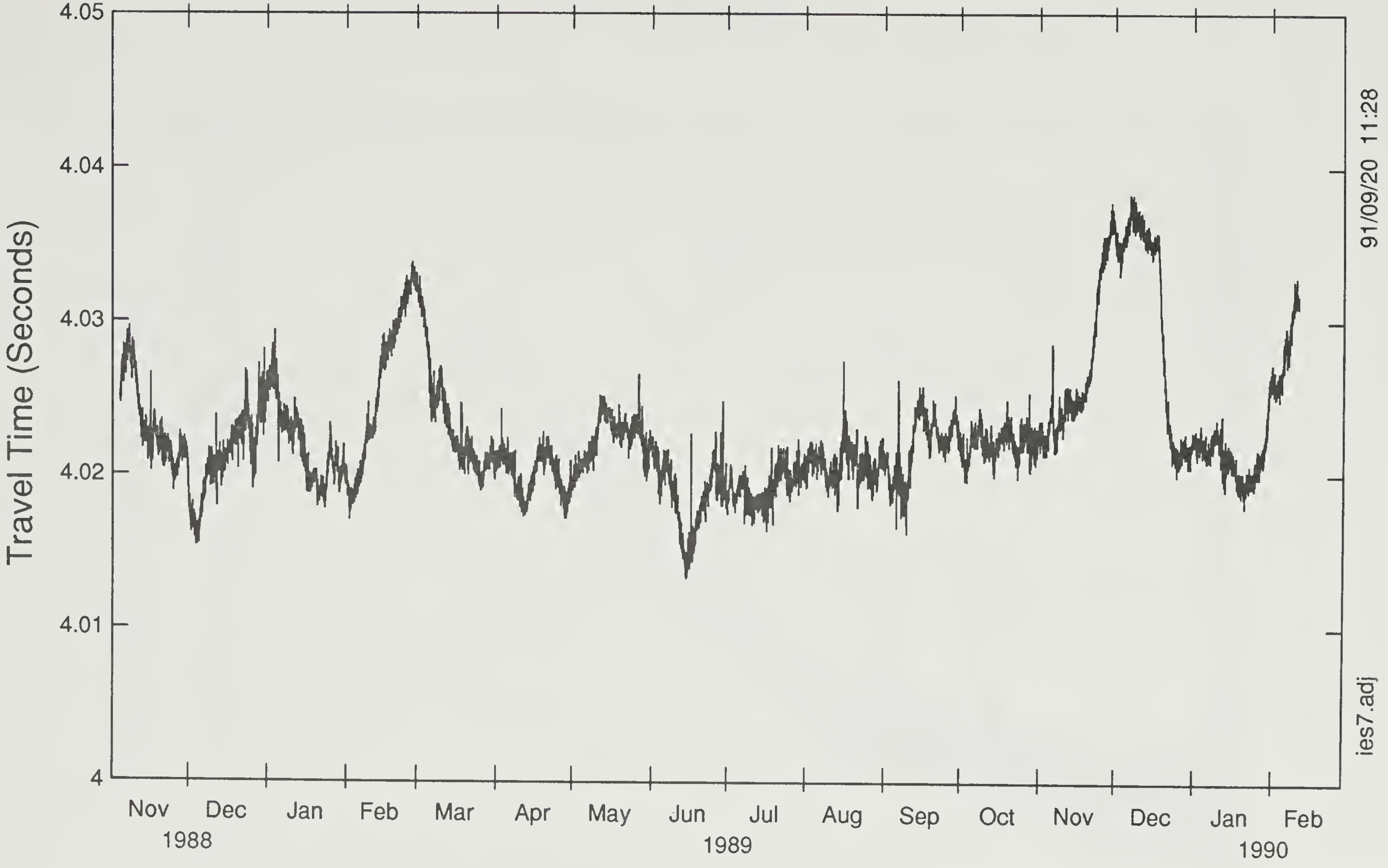
Ies #7
Travel Time



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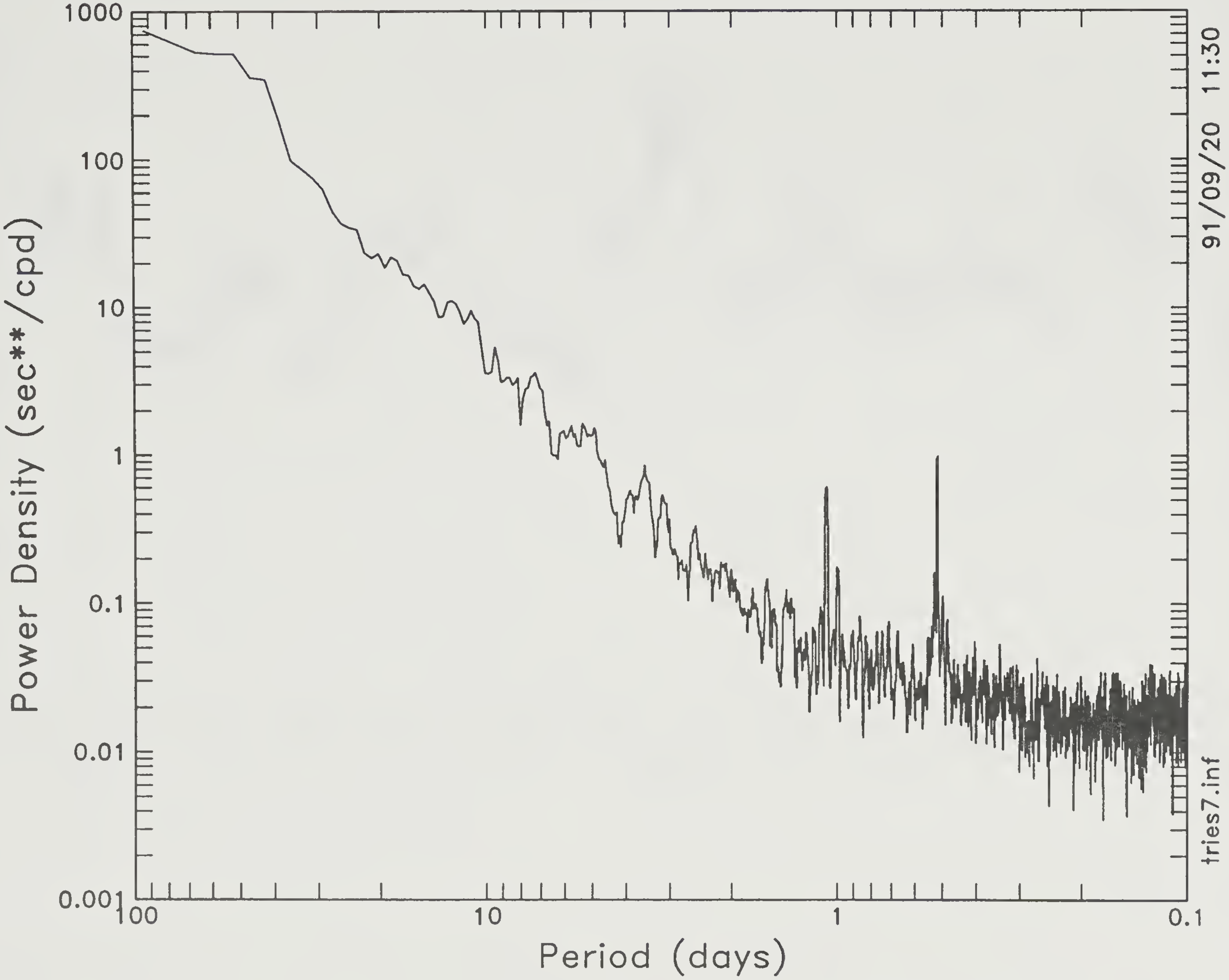
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0.1
0.01
0.001
100
10
1
0.1
Period (days)
91/09/20 11:30
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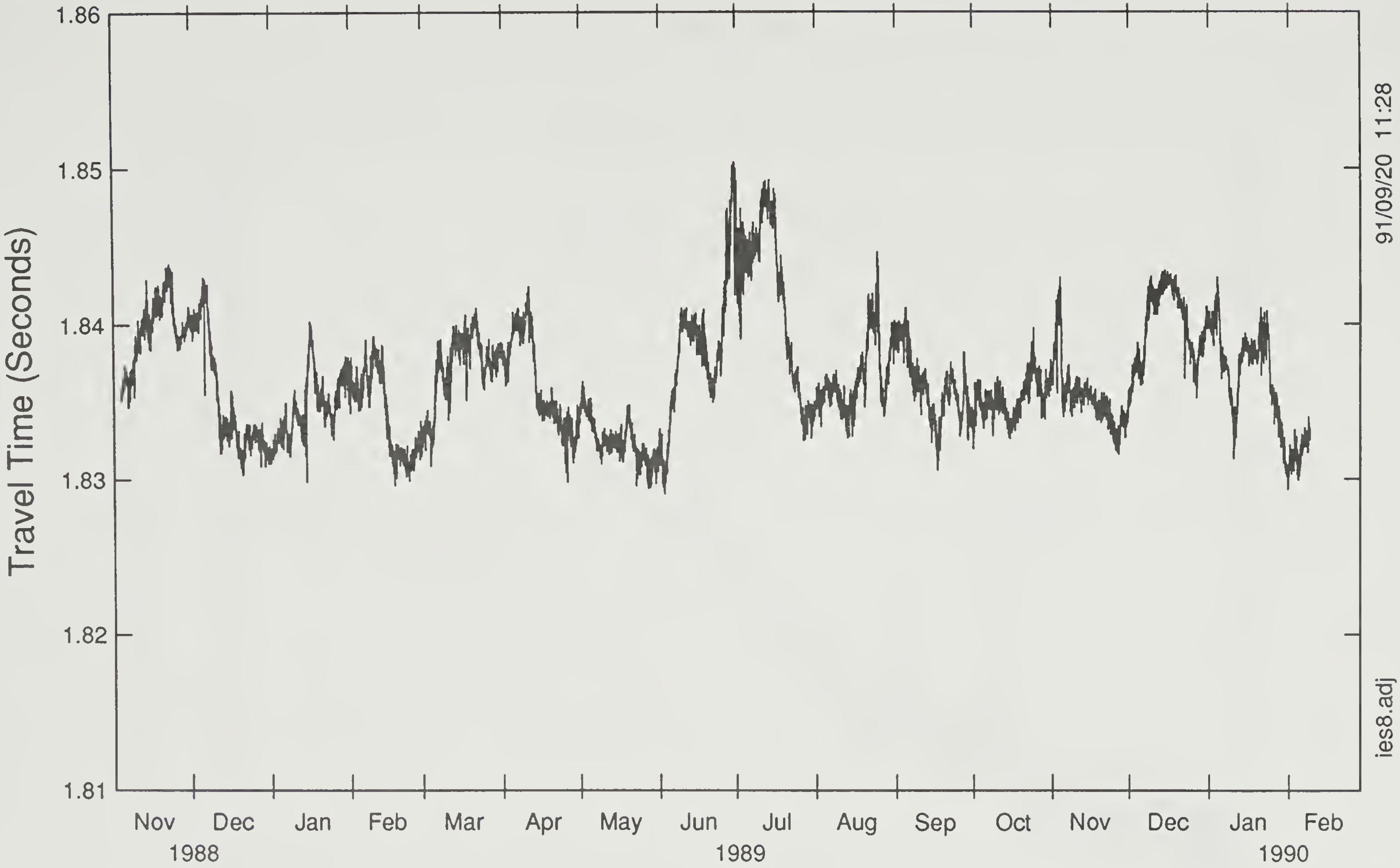
Ies #8
Travel Time



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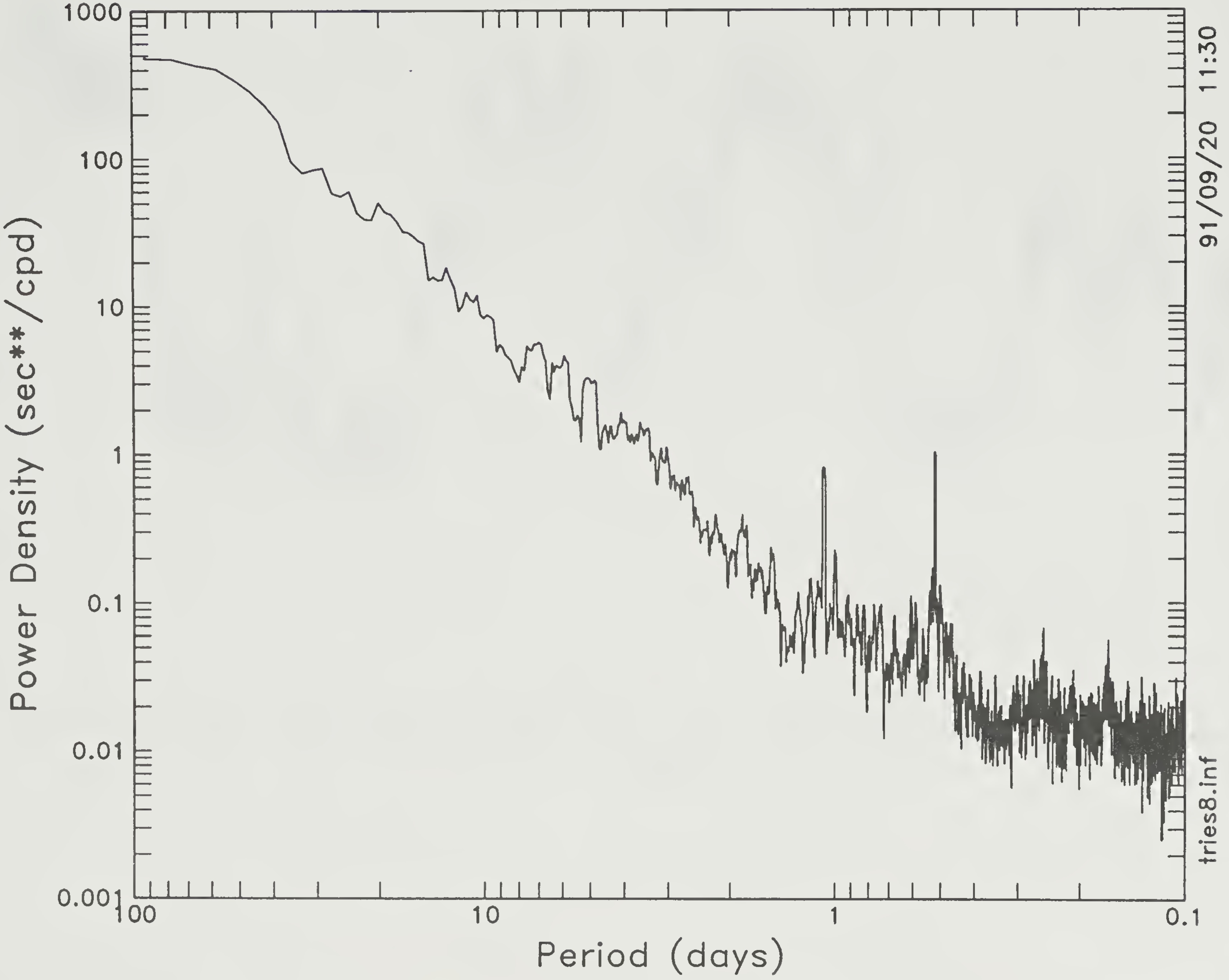

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1
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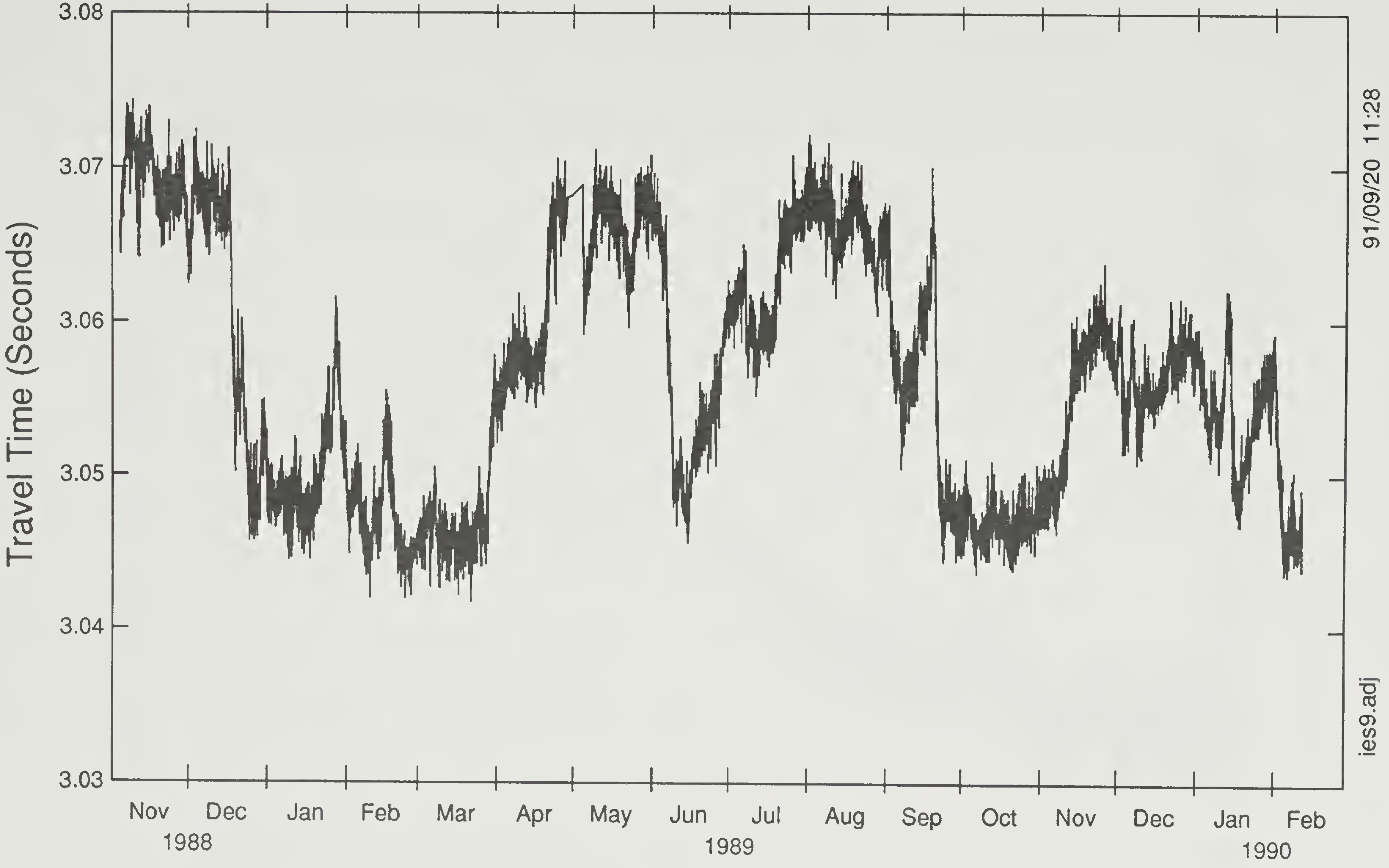
Period (days)
91/09/20 11:30
tries8.inf

Ies #9
Travel Time



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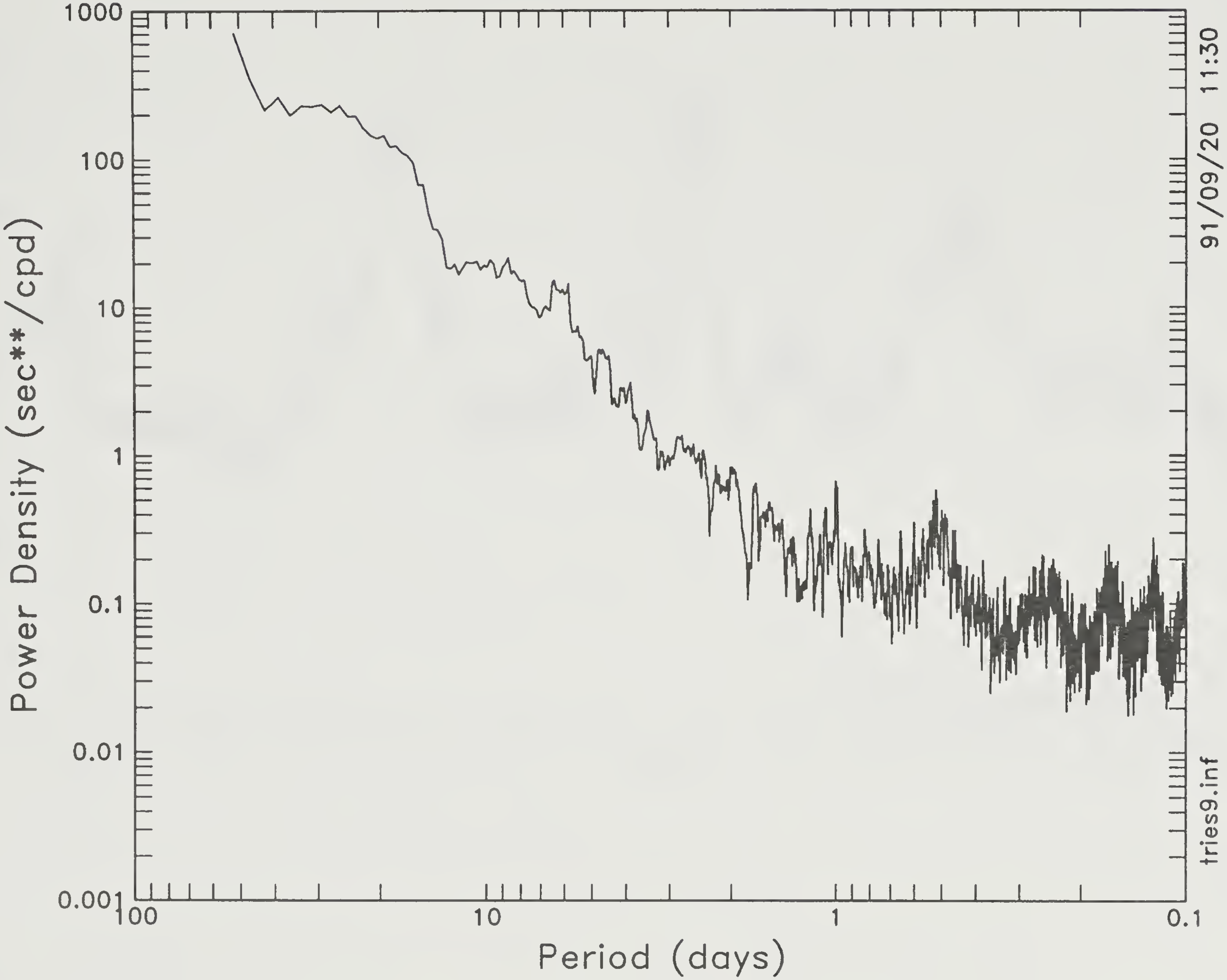

1000
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10
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0.1
0.01
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Power Density (sec**/cpd)
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Period (days)
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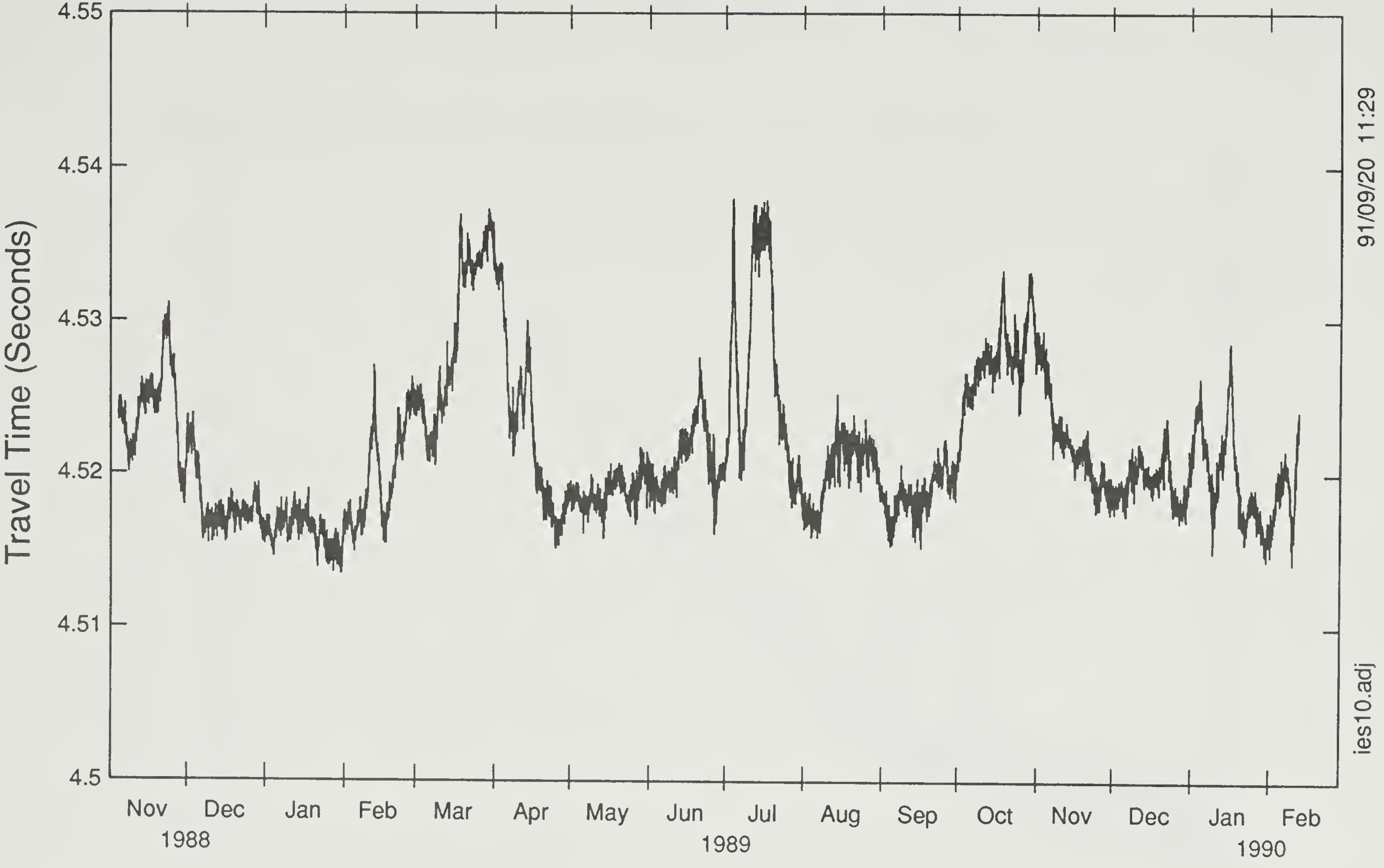
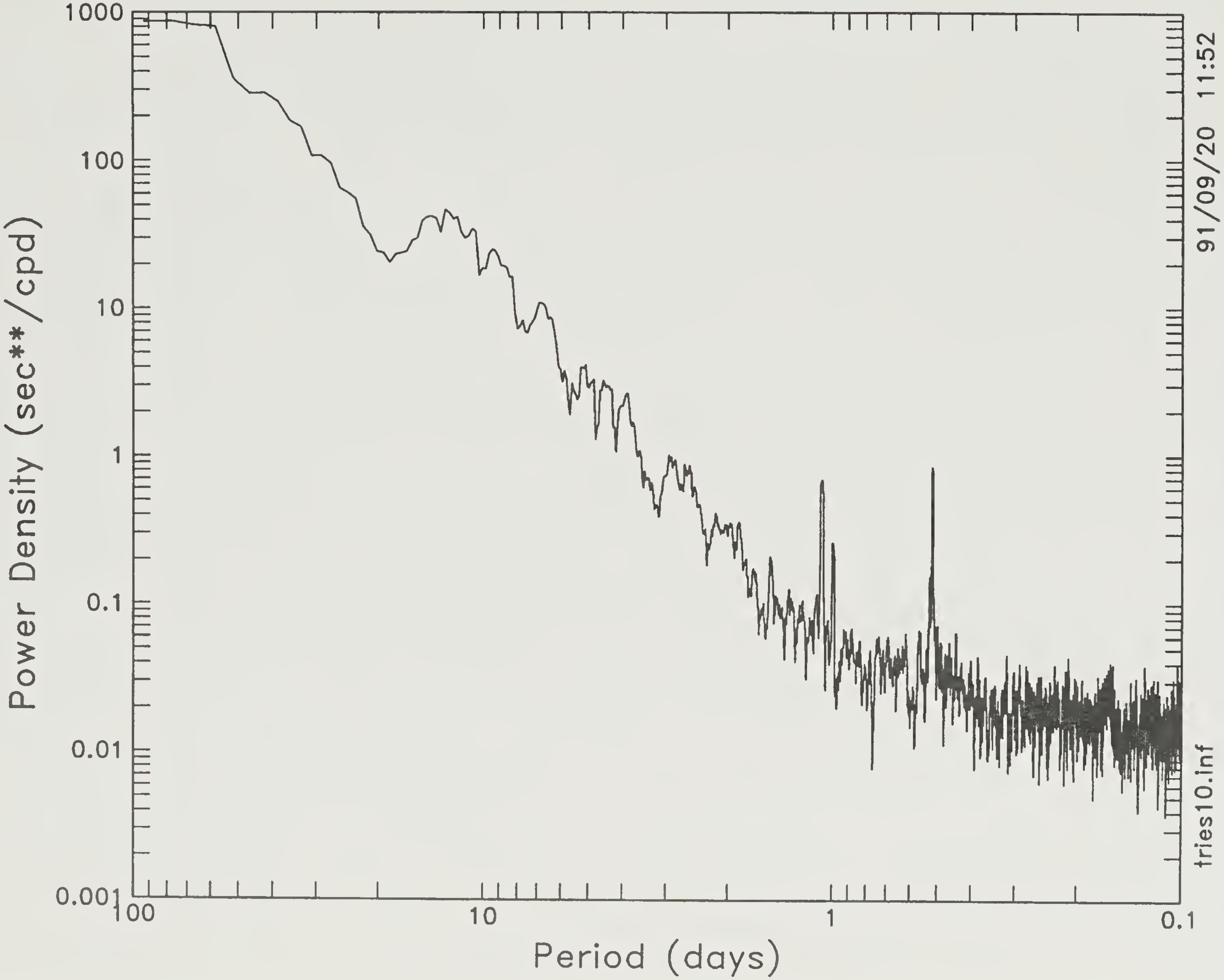
tries9.inf



Ies #10
Travel Time

les #10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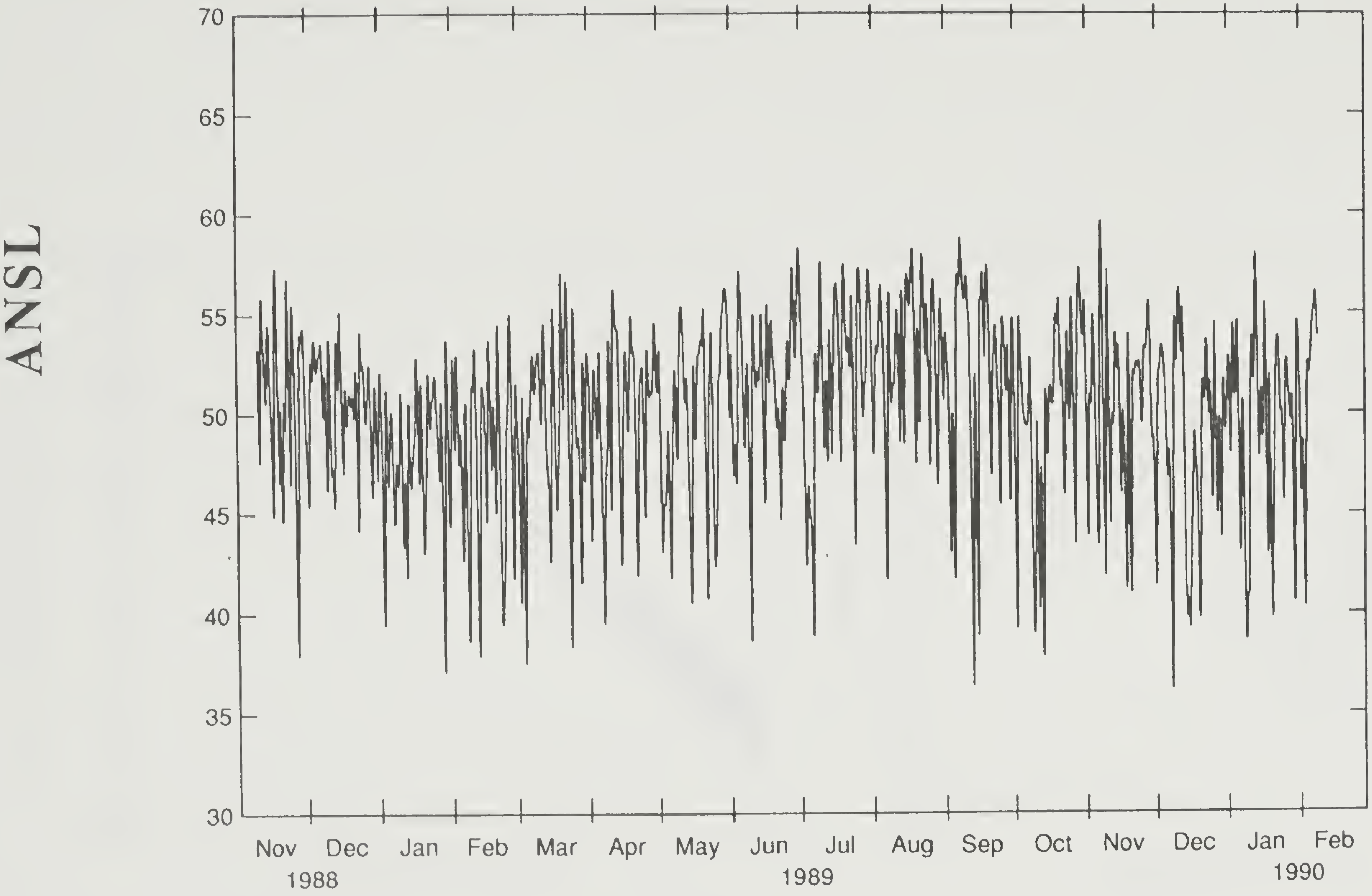
Ambient Noise Level Series, Power Density and Variance Preserving Spectra

IES #7


ANSL
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55
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45
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35
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Nov
Dec
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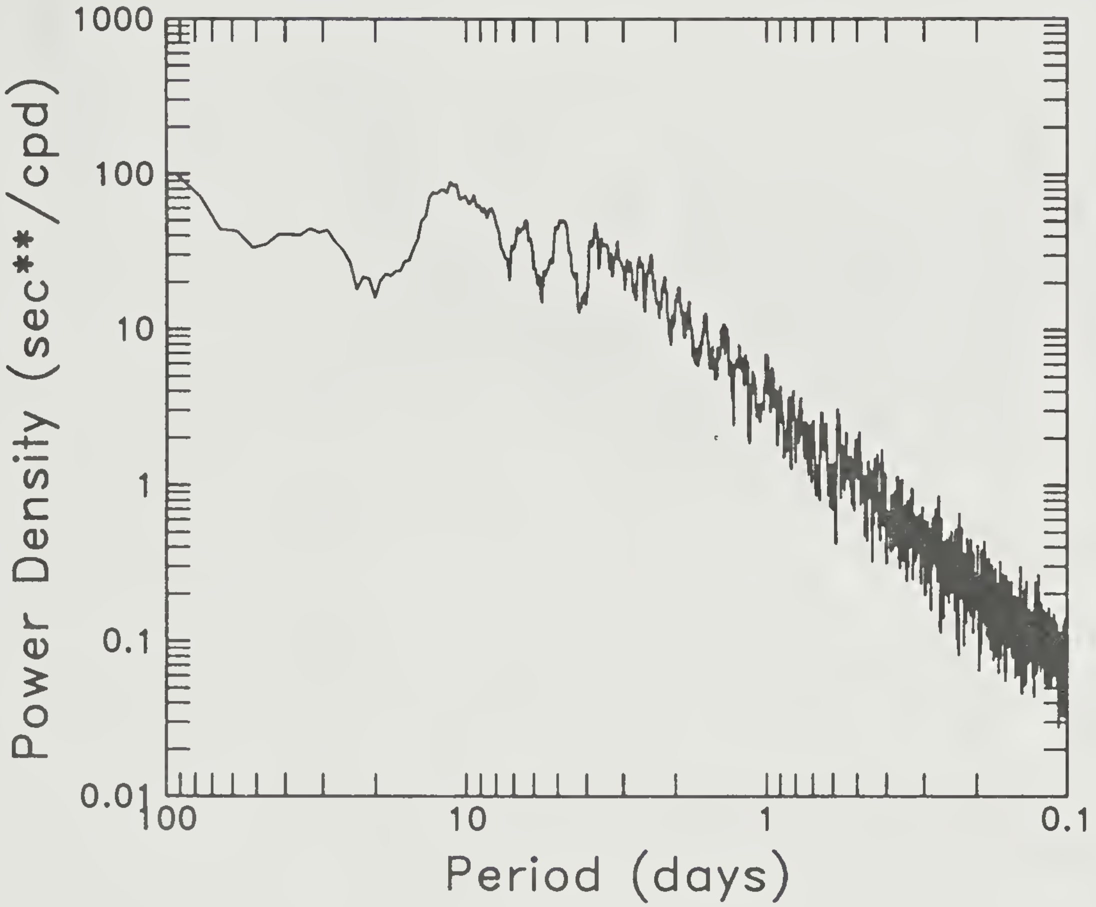
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
1988
1989
1990

IES #7



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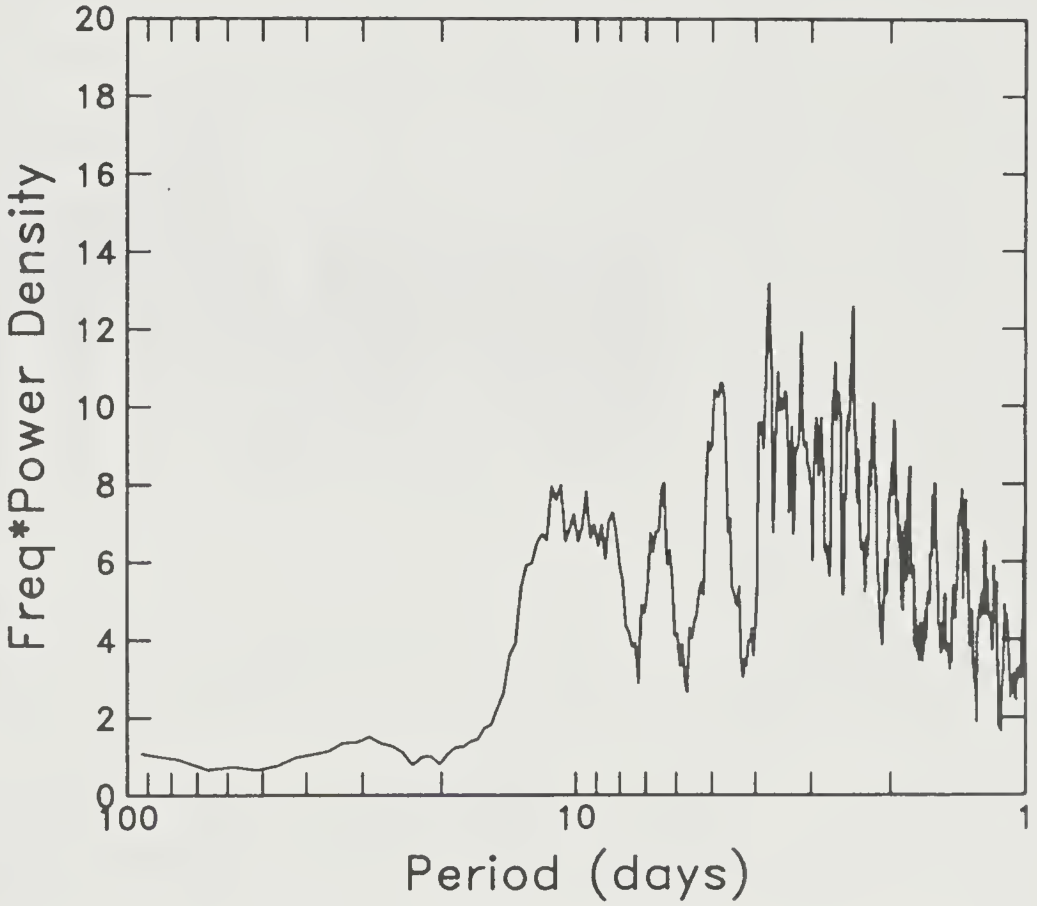
Period (days)



Freq*Power Density
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14
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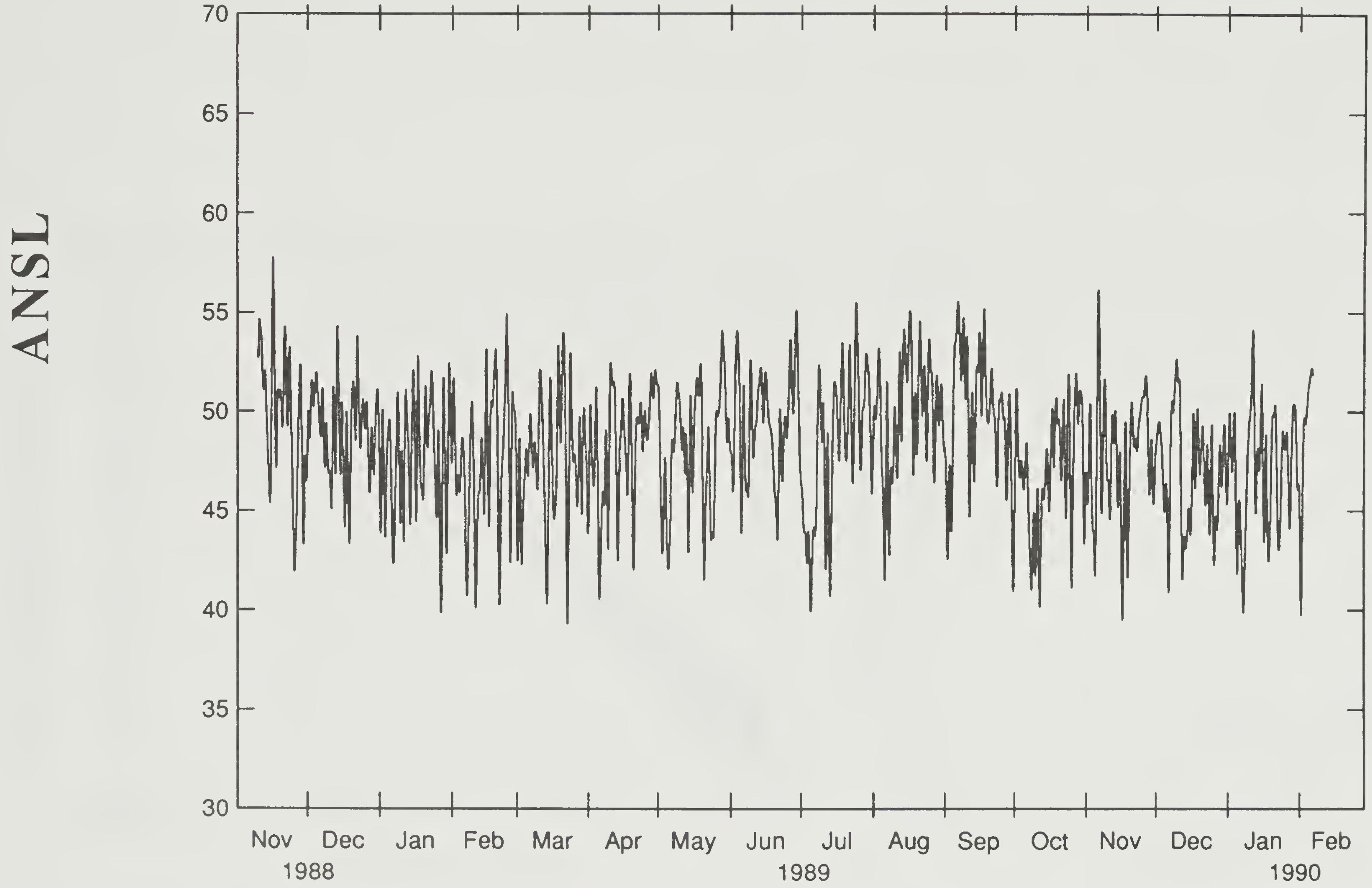
10
8
6
4
2
0
100
10
1
Period (days)

IES #8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Feb

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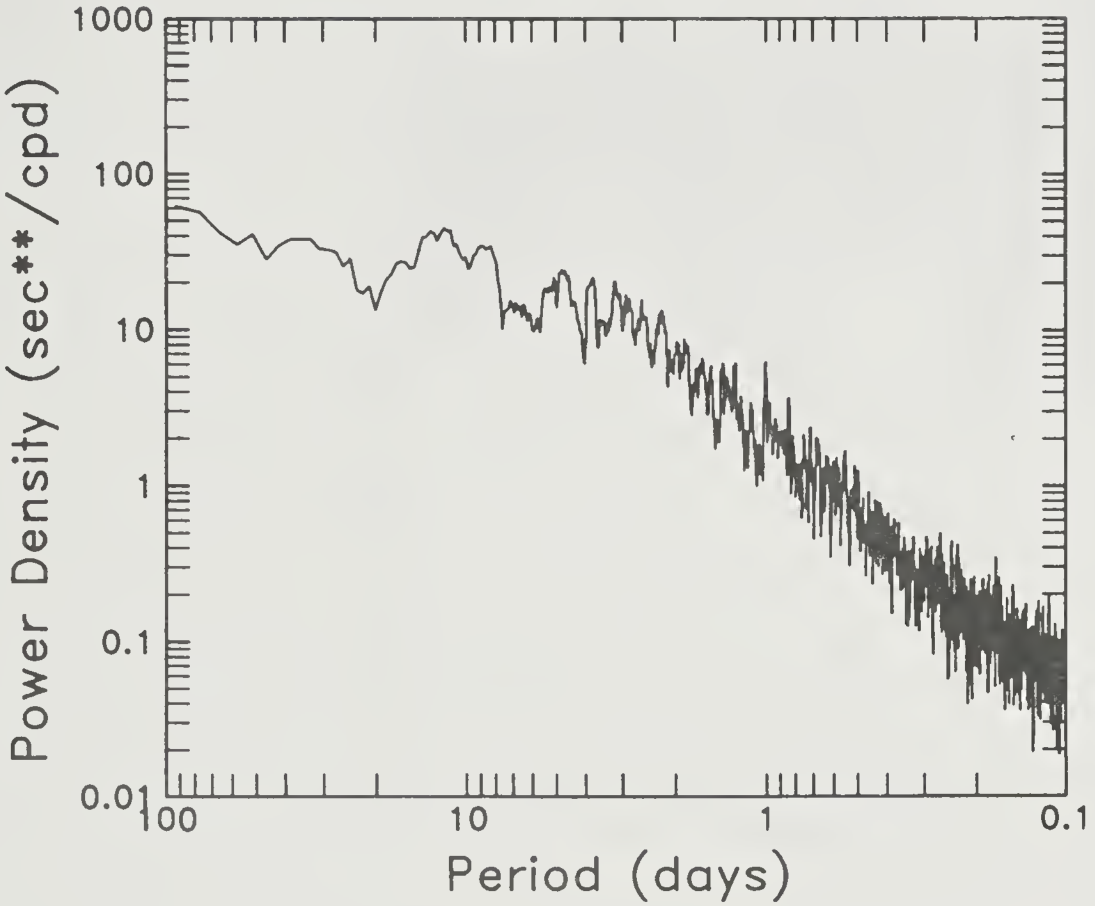
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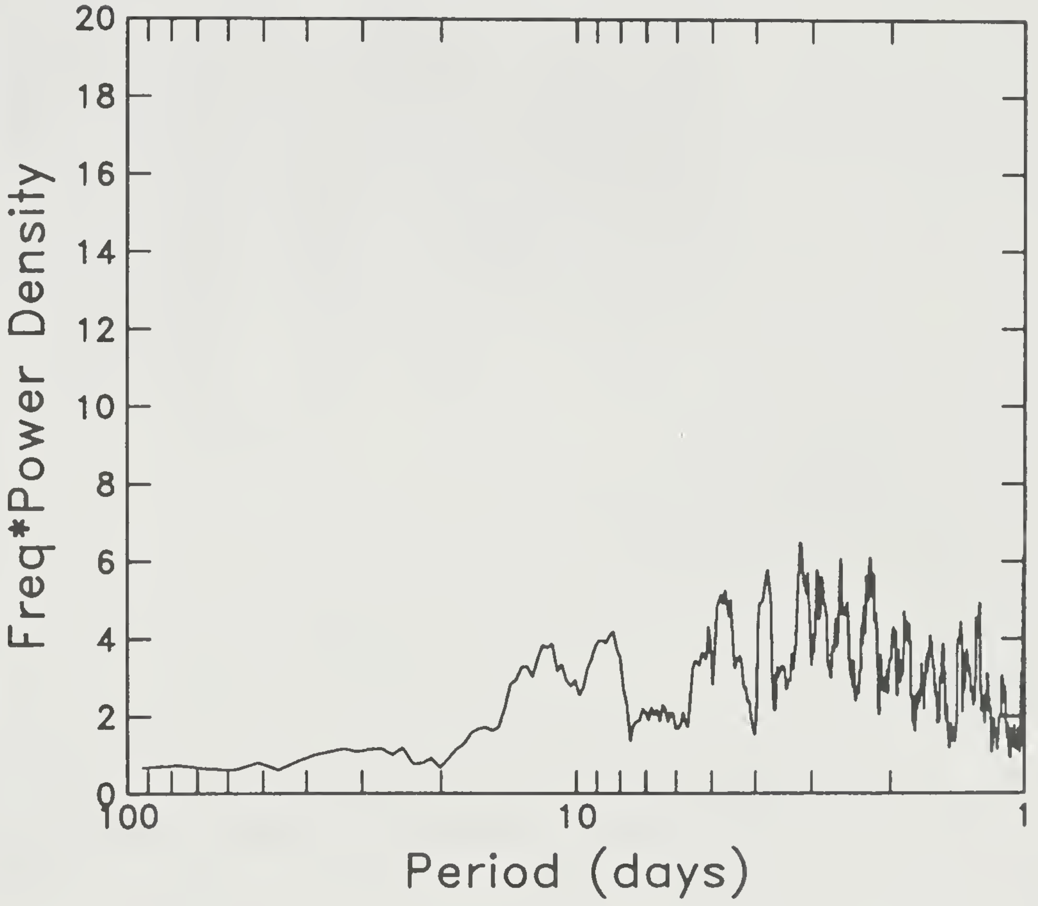
Period (days)


Freq*Power Density
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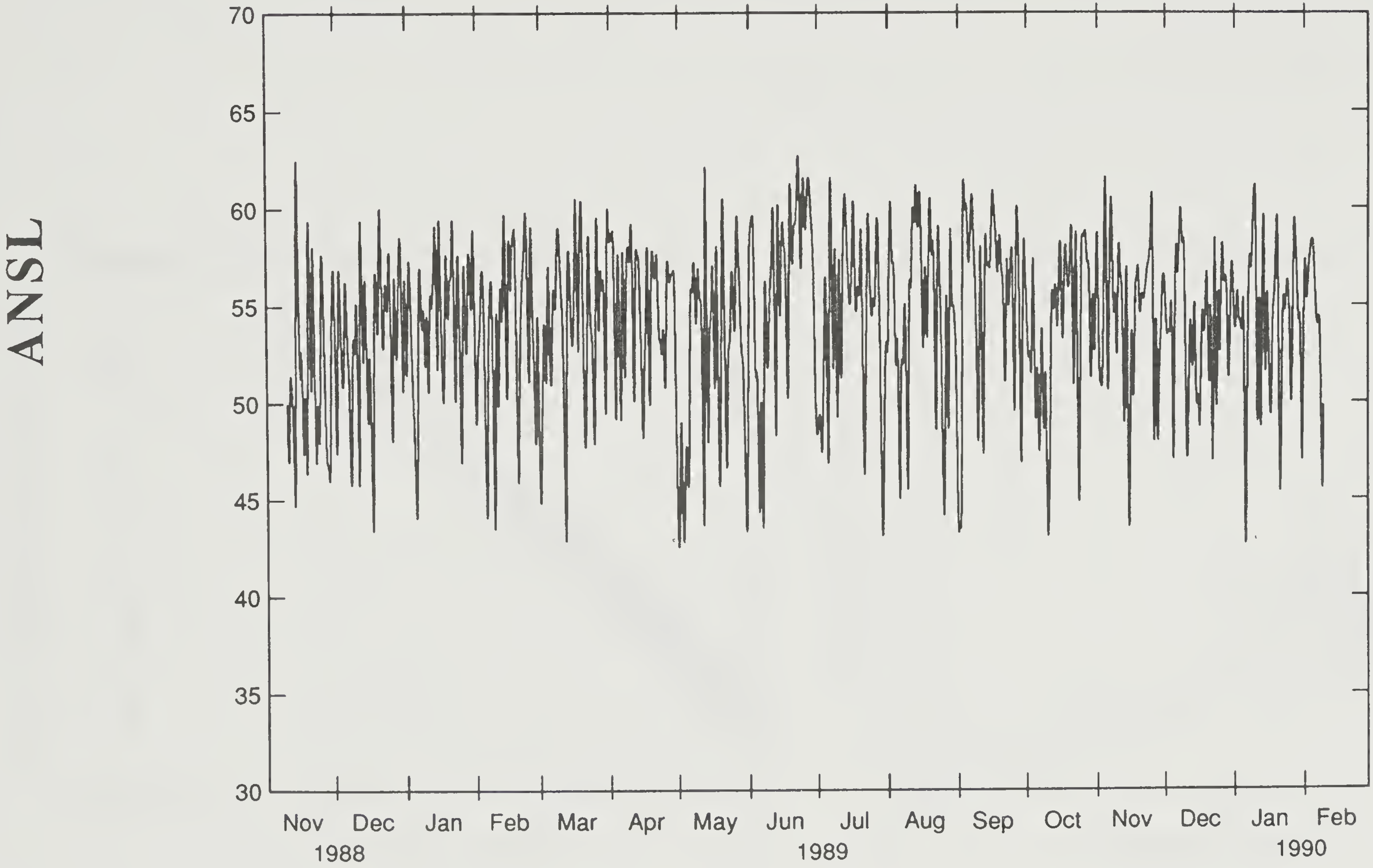
Period (days)

IES #9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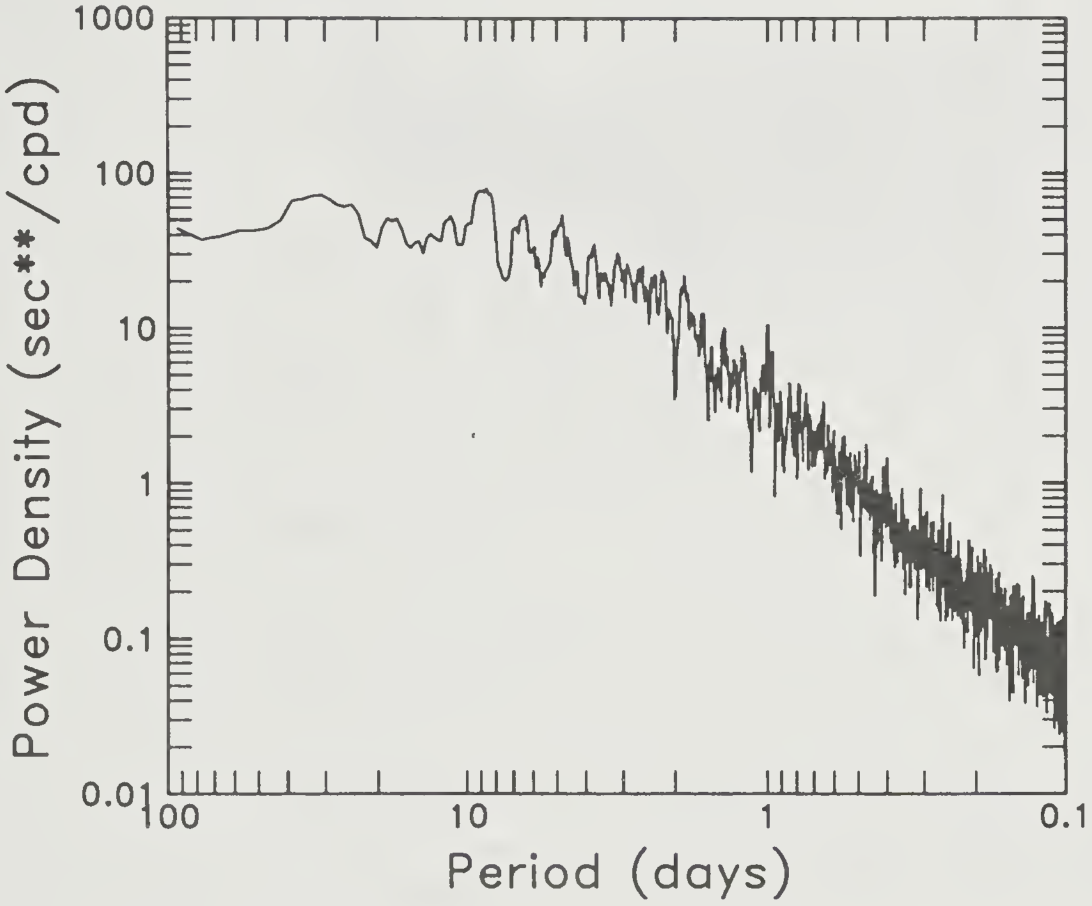
Dec
Jan
Feb
1988
1989
1990

IES #9



1000
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0.01
Power Density (sec**/cpd)
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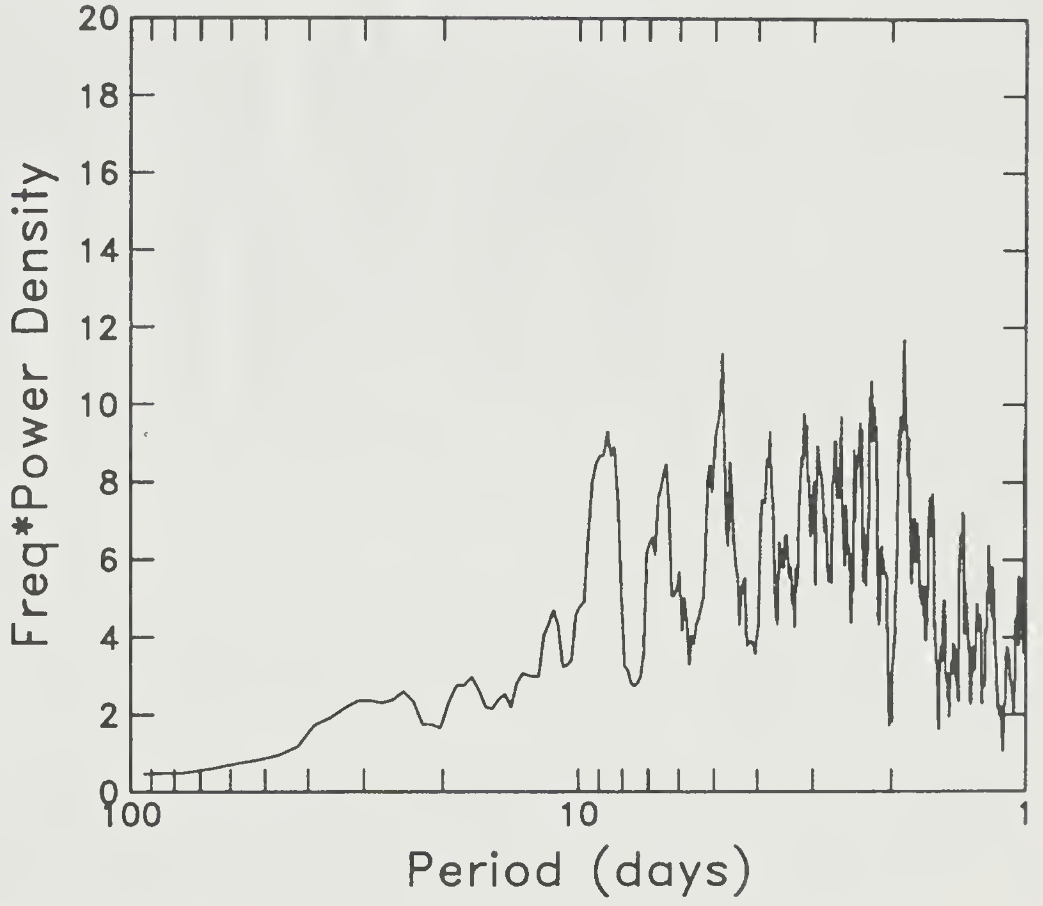
1
0.1
Period (days)



20
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8
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4
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0
Freq*Power Density
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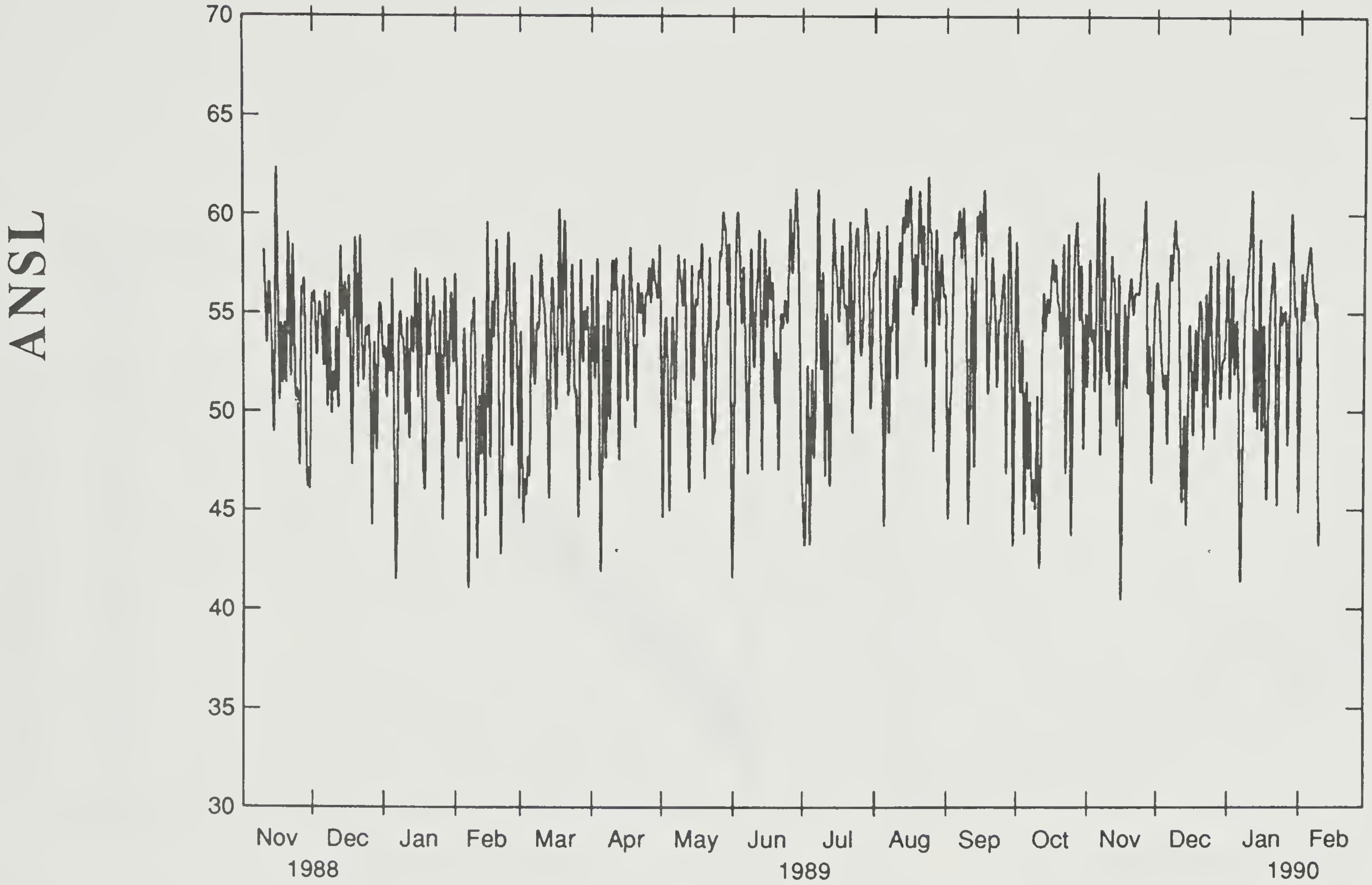
Period (days)

IES #10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Nov
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Jun
1989
Jul
Aug
Sep
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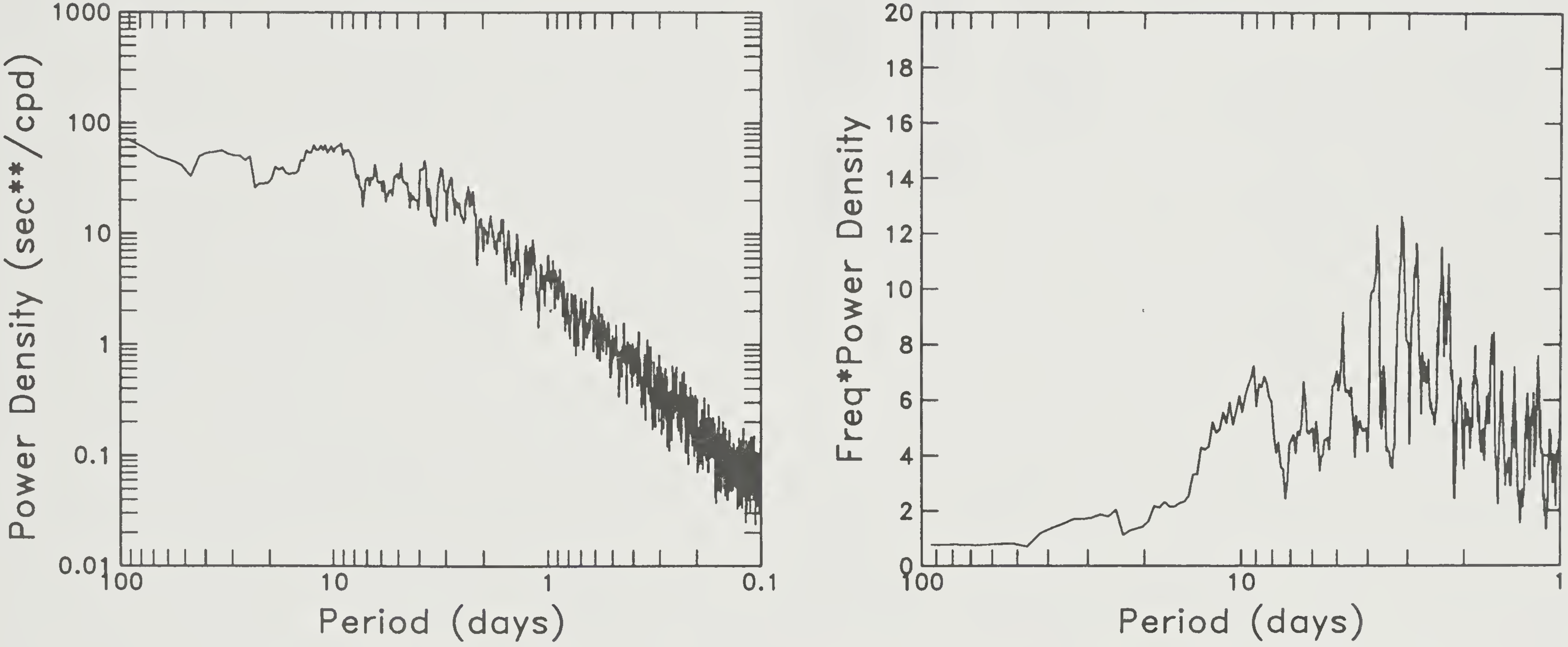
Nov
Dec
Jan
1990
Feb

IES #10


Power Density (sec**/cpd)
1000
100
10
1
0.1
0.01
100
10
1
0.1
Period (days)
Freq*Power Density
20
18
16
14
12
10
8
6
4
2
0
100
10
1
Period (days)

XBT

Cruise III

February 1990

XBT LAUNCHES

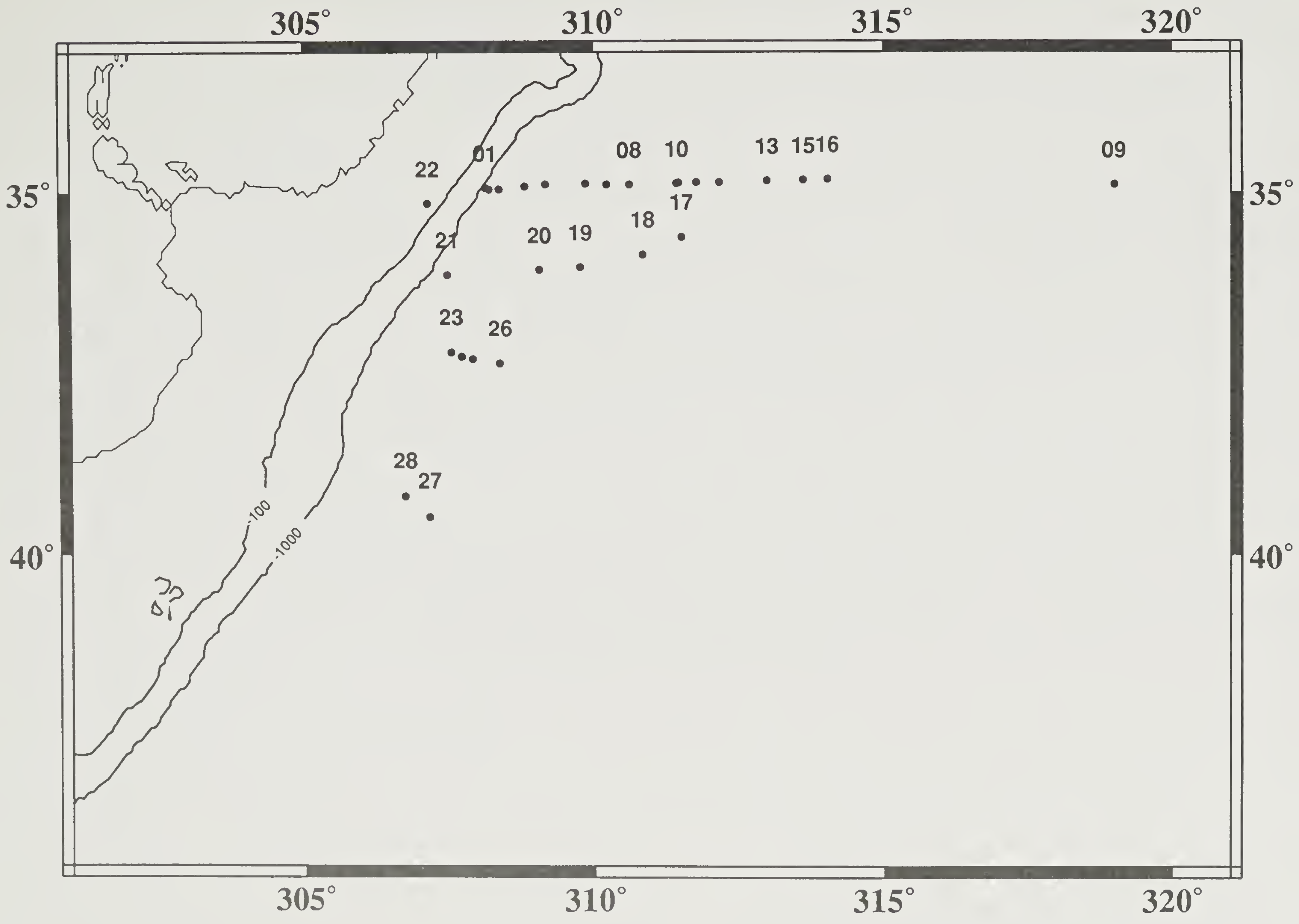


TABLE II

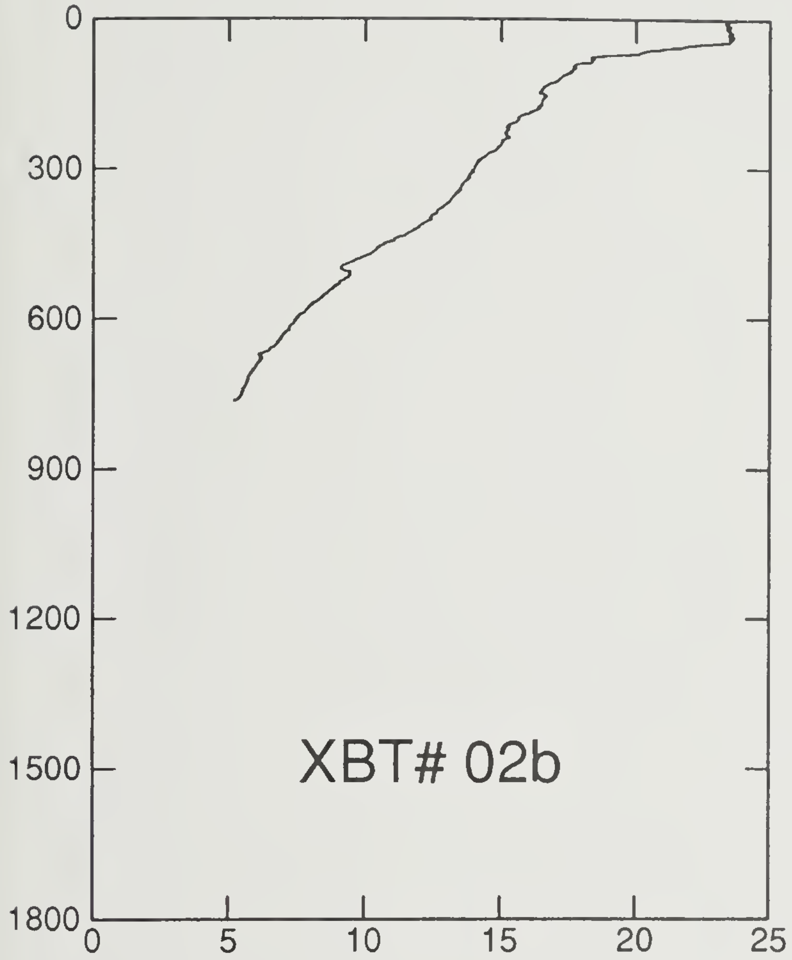
CONFLUENCE 90 - RV Le Suroit - February 1990

XBT #	LAT "(Deg, min)"	LONG "(Deg, min)"	DATE	GMT	Tsurf (3m)
0	35°22.91'S	52°31.67'W	2/17/91	2:01	24.1
1	35° 26.7'S	52°21.7'W	2/17/91	6:24	23.9
2	35°27.7'S	52°17.89'W	2/17/91	8:15	23.6
3	35°27.5'S	52°08.6'W	2/17/91	11:03	23.1
4	35°25.10'S	51°41.51'W	2/17/91	15:59	23.5
5	35°23.5'S	51°20.3'W	2/17/91	17:10	23.8
6	35°22.6'S	50°39'W	2/18/91	1:32	* 24.7
7	35°23.4'S	50°17'W	2/18/91	3:10	* 24.6
8	35°23.6'S	49°53.8'W	2/18/91	5:28	24.2

XBT #	LAT "(Deg, min)"	LONG "(Deg, min)"	DATE	GMT	Tsurf (3m)
9	35°23.21'S	49°30.4'W	2/18/91	8:34	* 24.7
10	35°22.3'S	42°2.9'W	2/18/91	15:47	22.6
11	35°21.8'S	48°44.2'W	2/18/91	17:10	22.3
12	35°21.5'S	48°20.3'W	2/18/91	18:50	22.5
13	35°20.5'S	47°30.5'W	2/19/91	7:20	22.4
14	35°20.2'S	47°15.7'W	2/19/91	8:25	23.1
15	35°20'S	45°53.2'W	2/19/91	10:02	23.1
16	35°19.04'S	46°28.2'W	2/19/91	12:18	22.2
17	36°08.03'S	48°95.69'W	2/20/91	7:39	21
18	36°22.9'S	49°40.1'W	2/20/91	11:06	21.6
19	36°33.9'S	50°44.36'W	2/20/91	20:30	22.7
21	36°39.7'S	53°00.6'W	2/21/91	22:00	23

XBT #	LAT "(Deg, min)"	LONG "(Deg, min)"	DATE	GMT	Tsurf (3m)
22	37°39.6'S	53°20.9'W	2/23/91	11:51	23
23	37°44.3'S	52°57.1'W	2/23/91	16:58	* 23.1
24	37°47.42'S	52°46.18'W	2/23/91	18:10	23.4
25	37°50.01'S	52°35.01'W	2/24/91	1:50	23.1
26	37°53.9'S	52°07.2'W	2/24/91	8:05	23.4
27	39°58.9'S	53°20.0'W	2/25/91	11:51	15.1
28	39°42.43'S	53°44.65'W	2/25/91	19:03	15.2

NOTE: Sea Surface Temperature marked with a * were considered doubtfull.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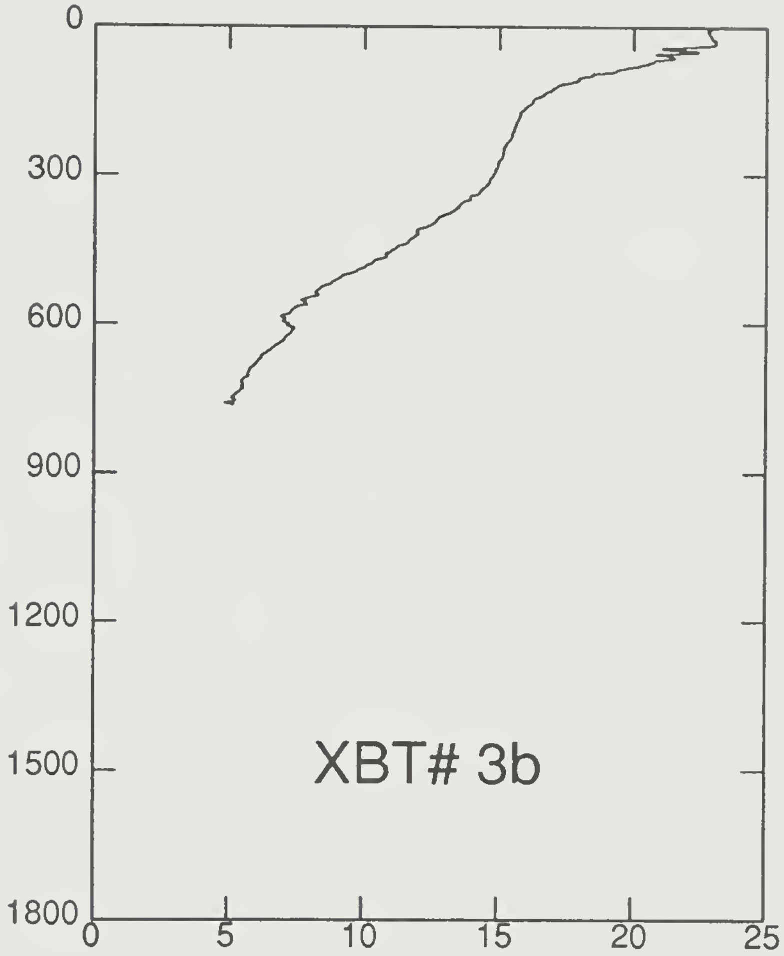
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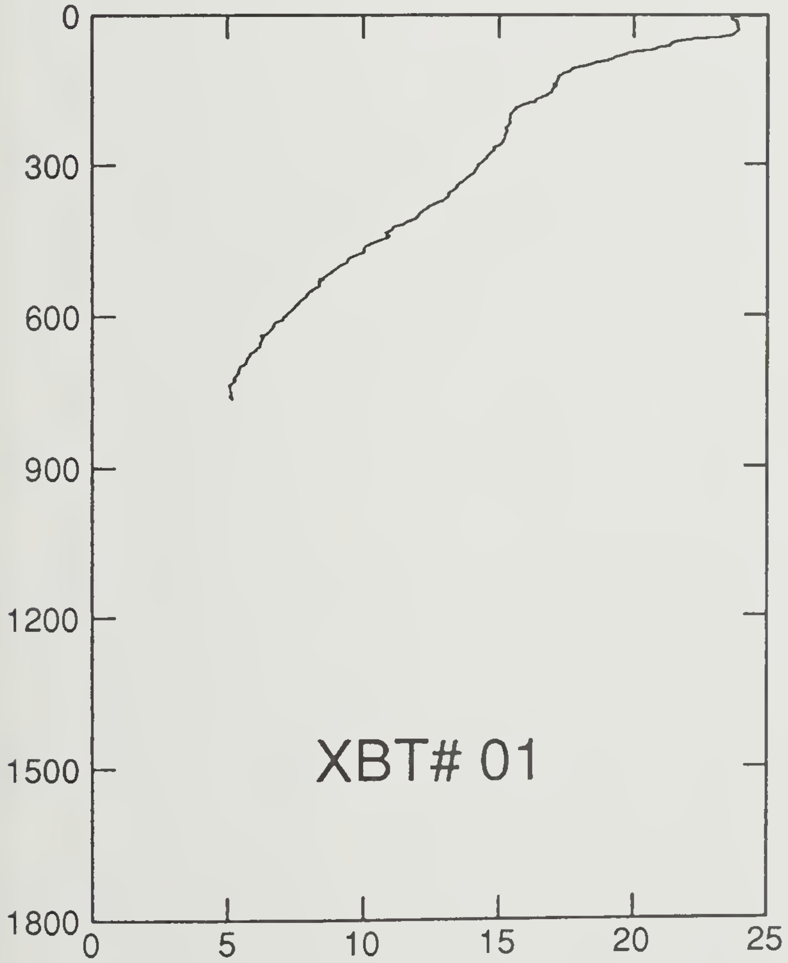
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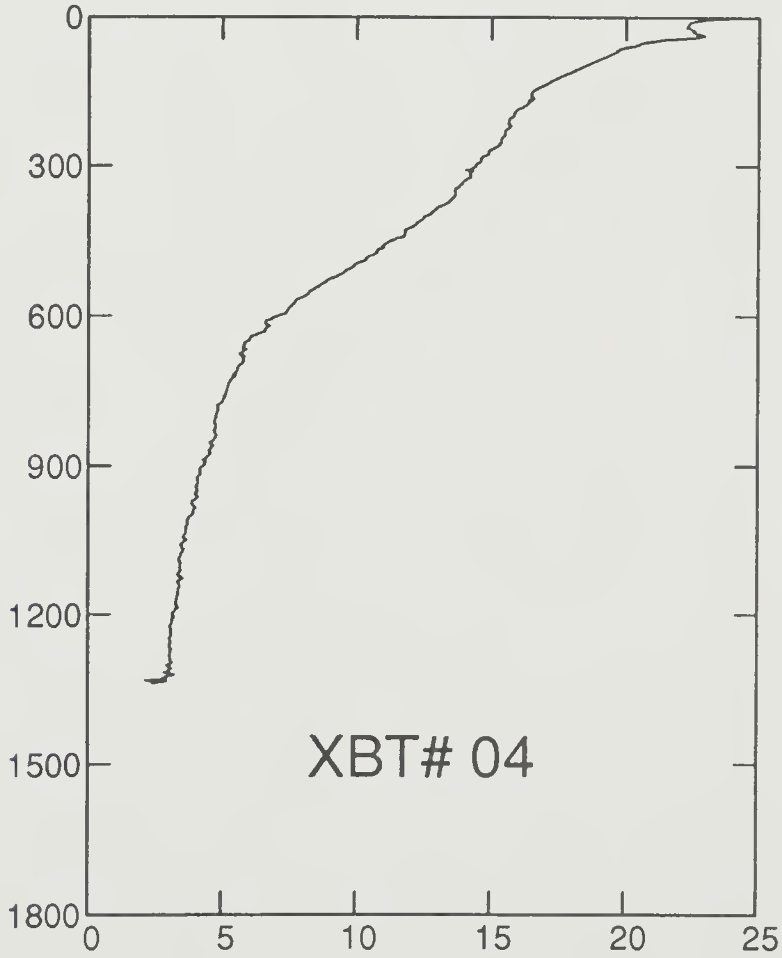
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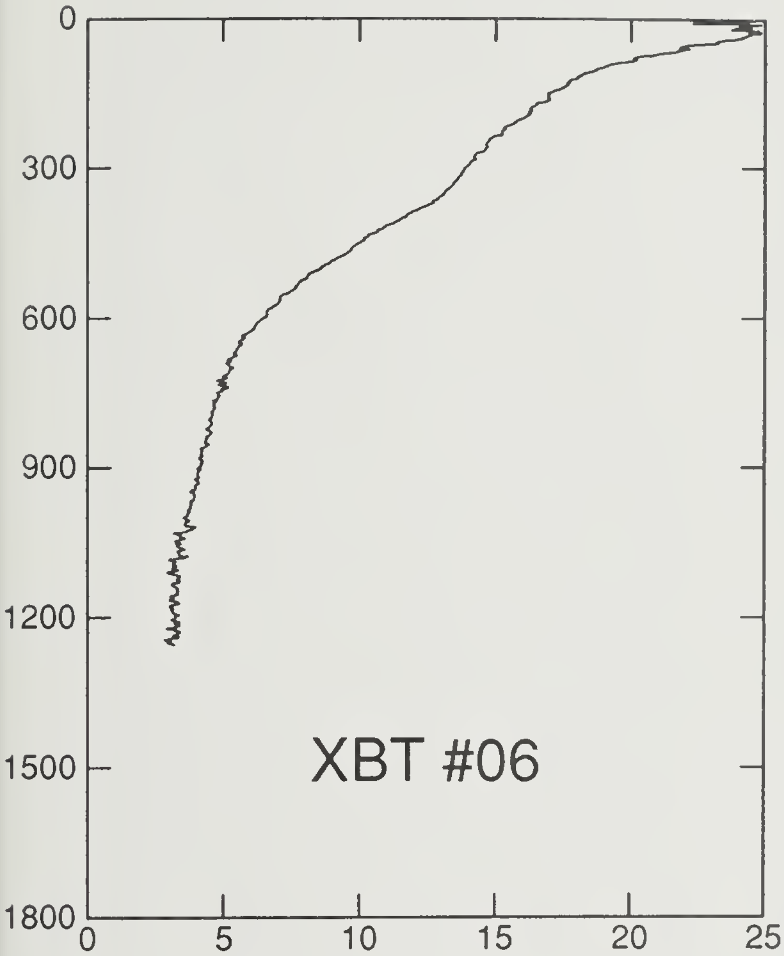
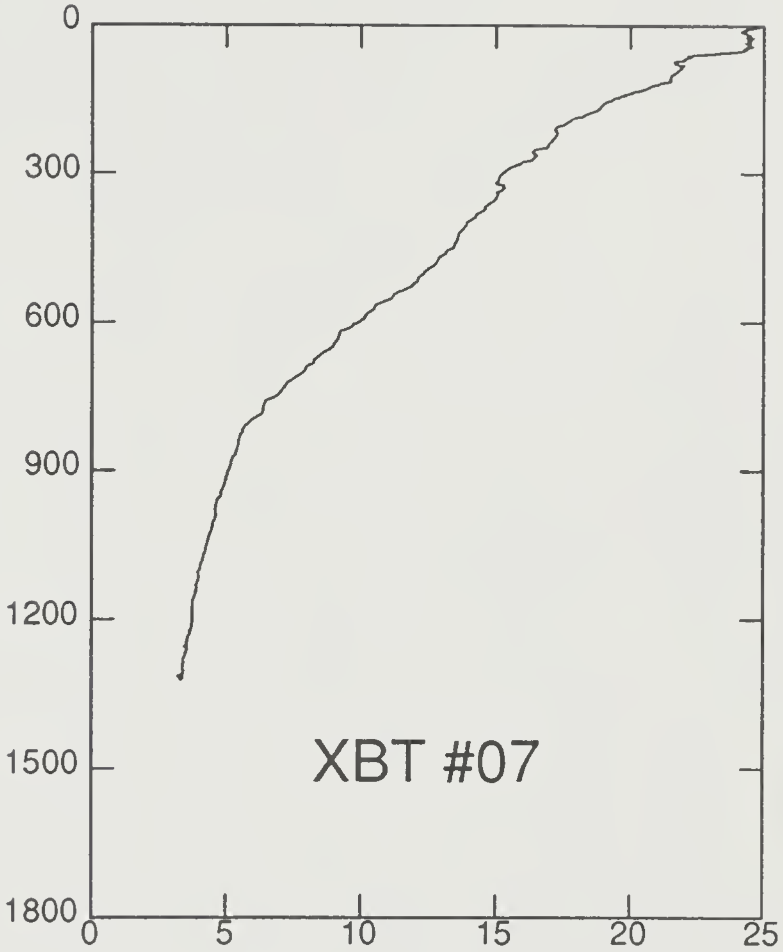

XBT #06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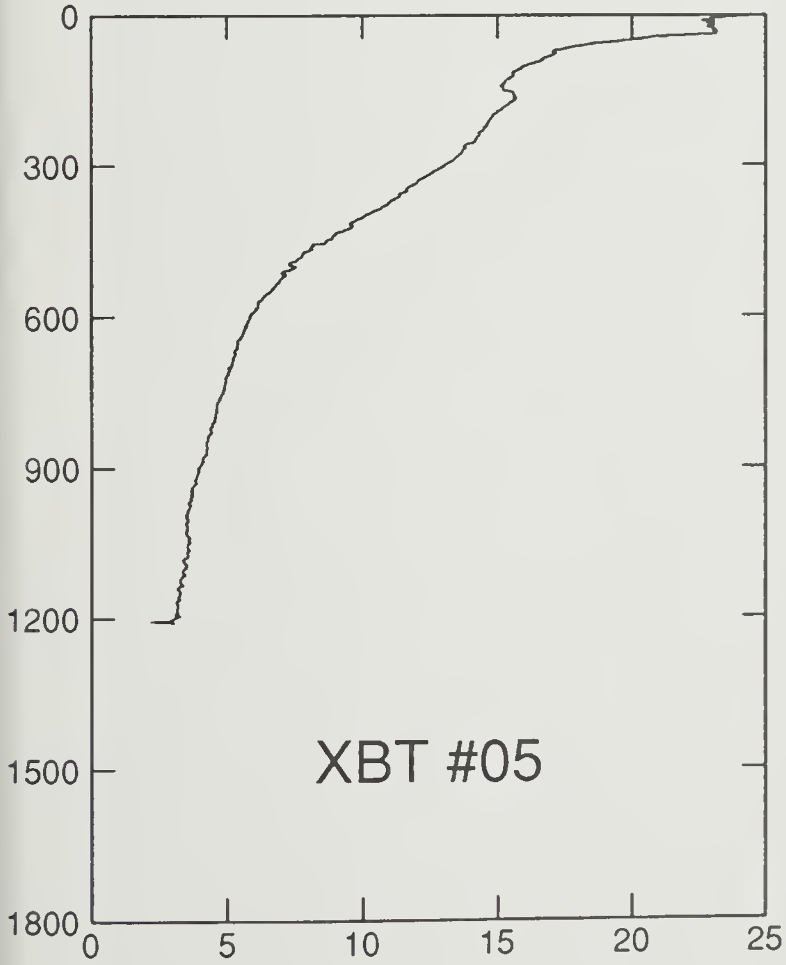
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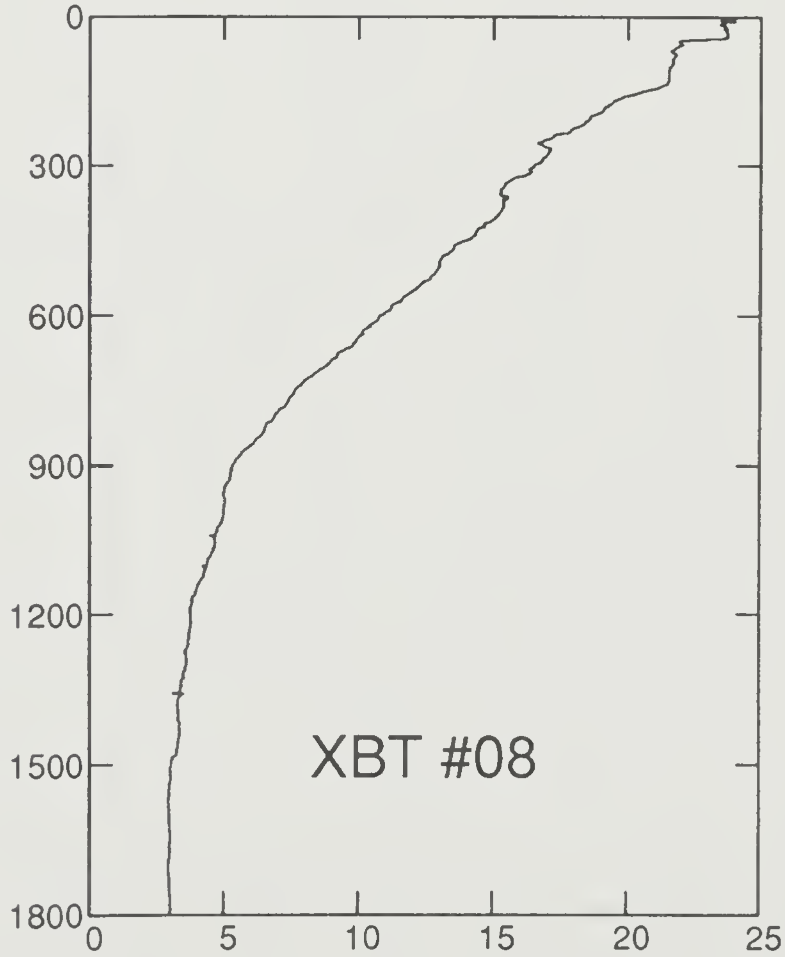
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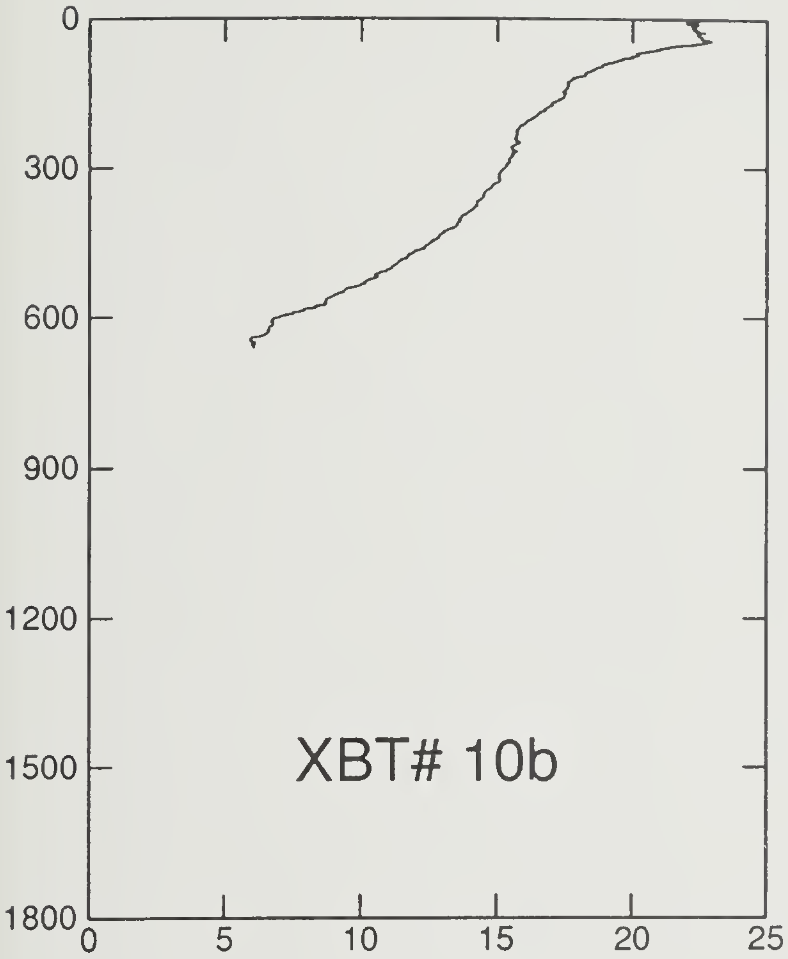
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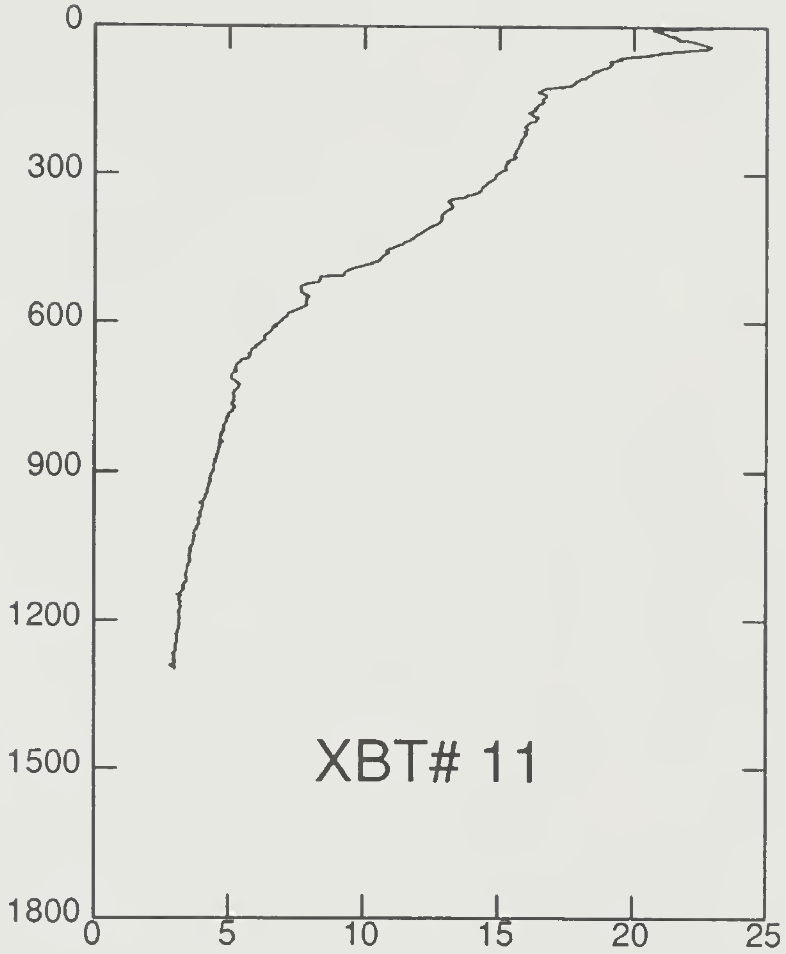
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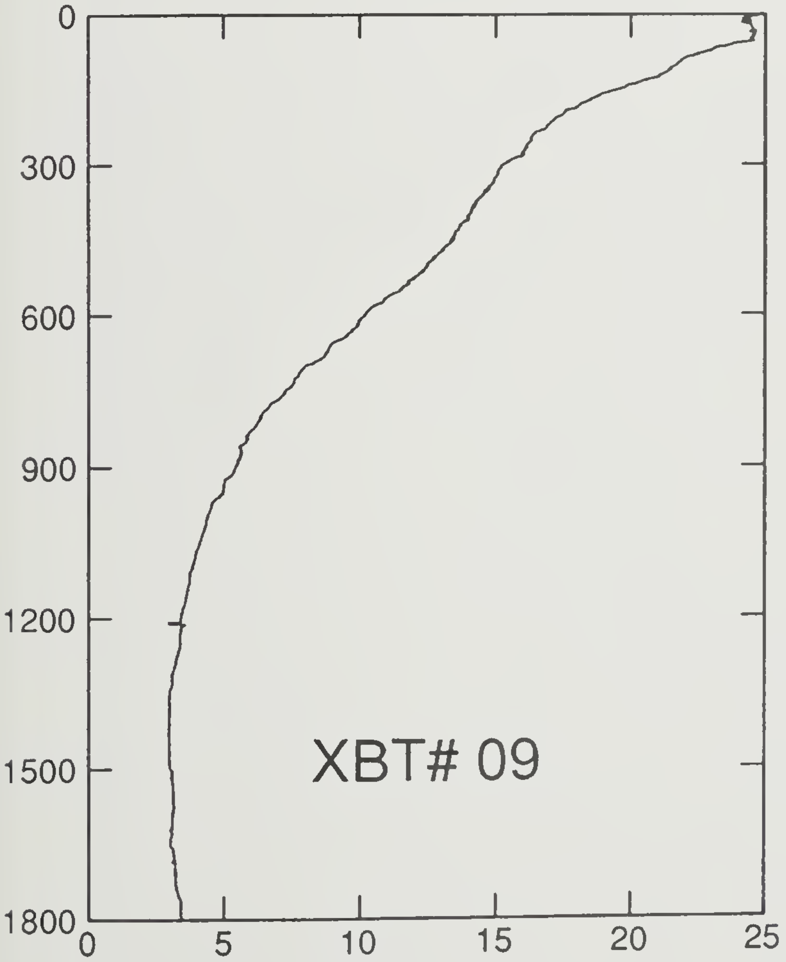
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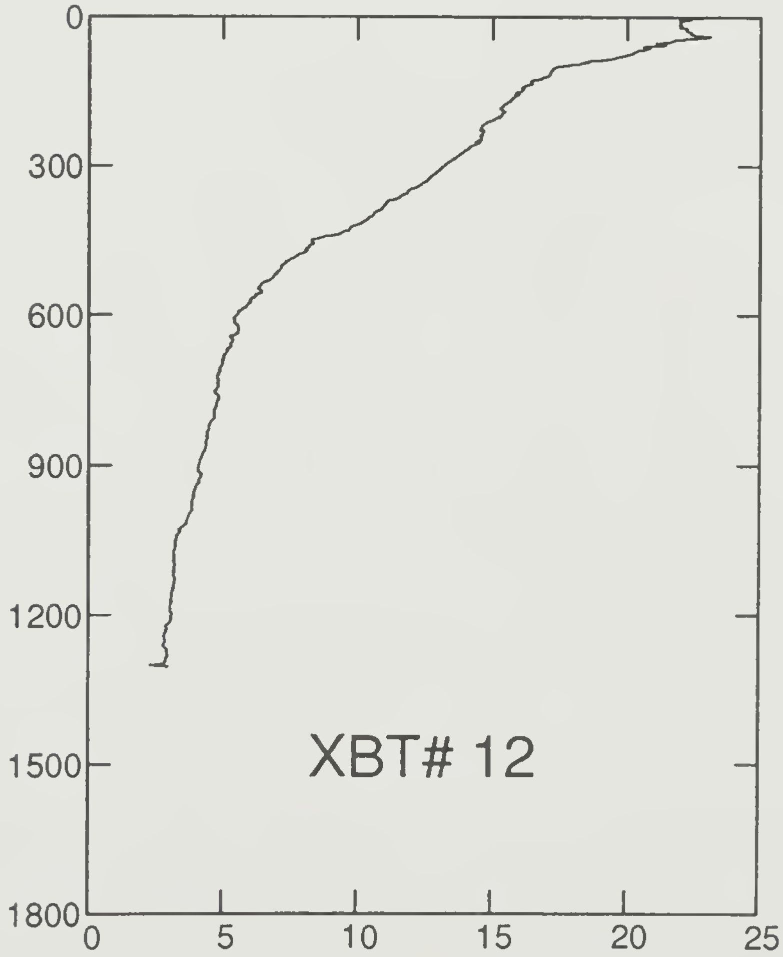
10
15
20
25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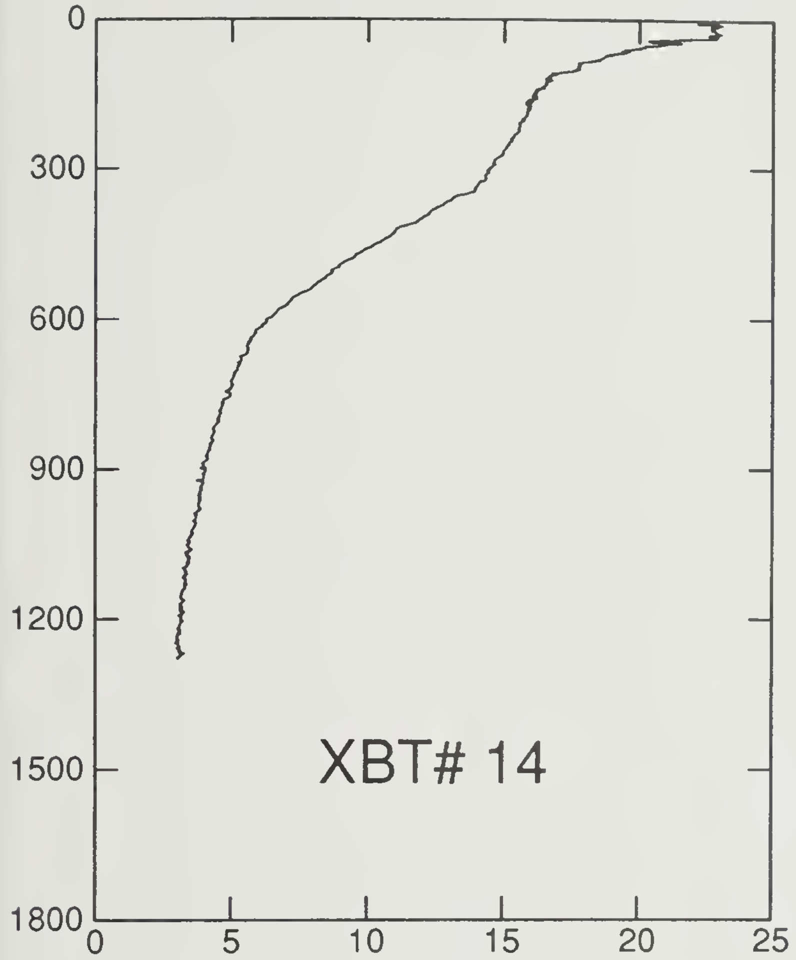
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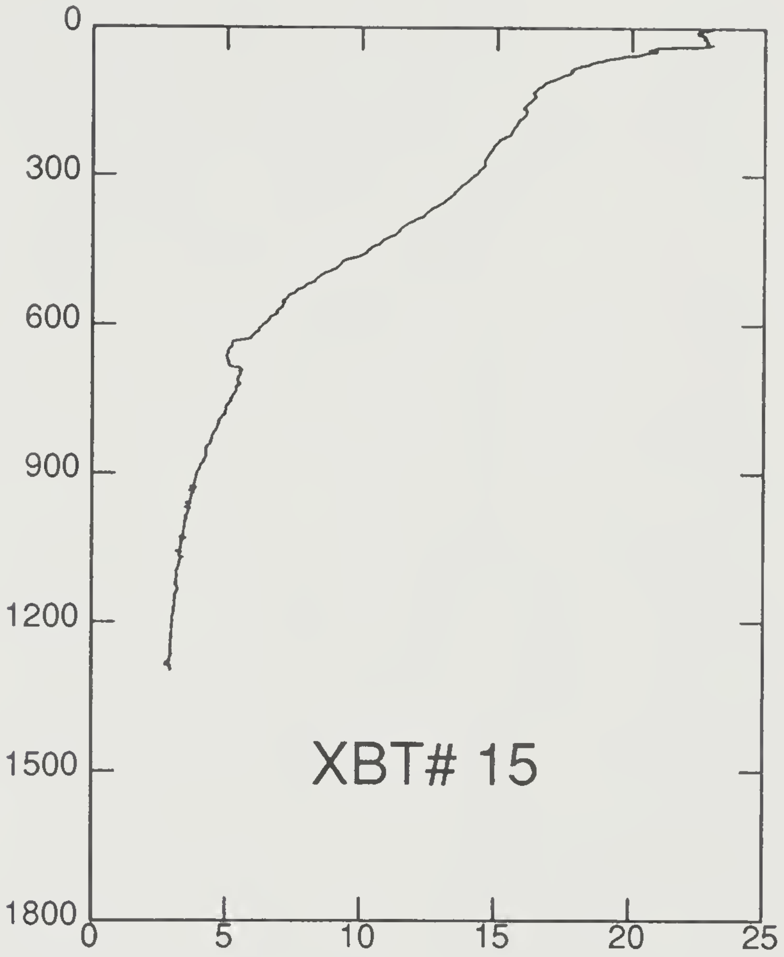
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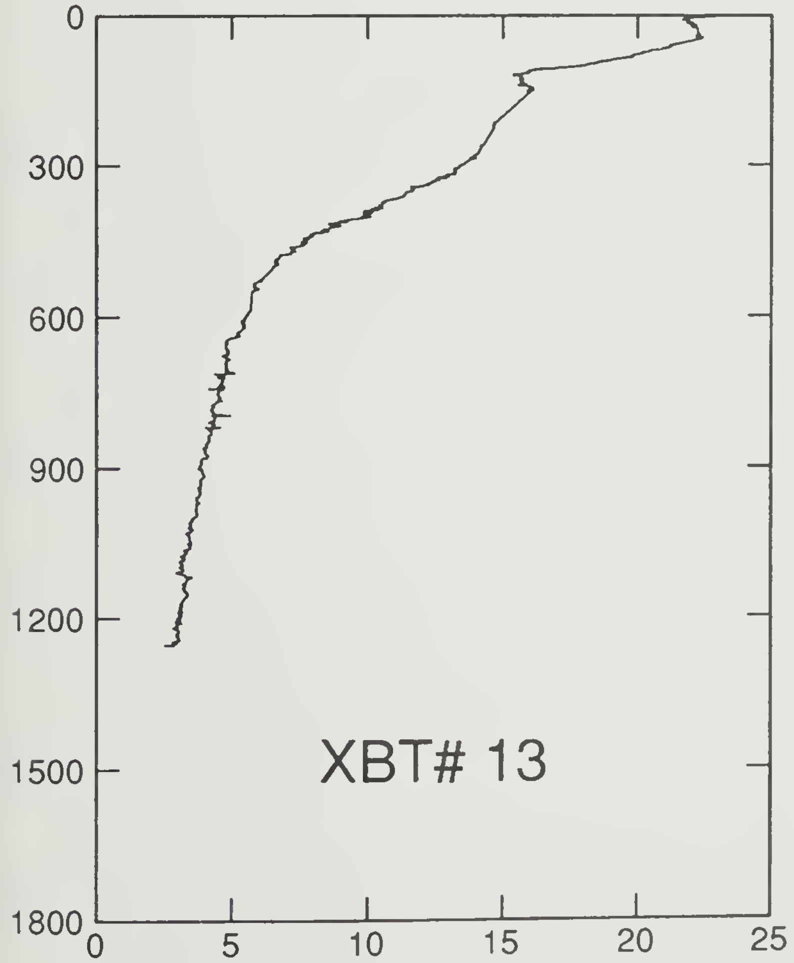
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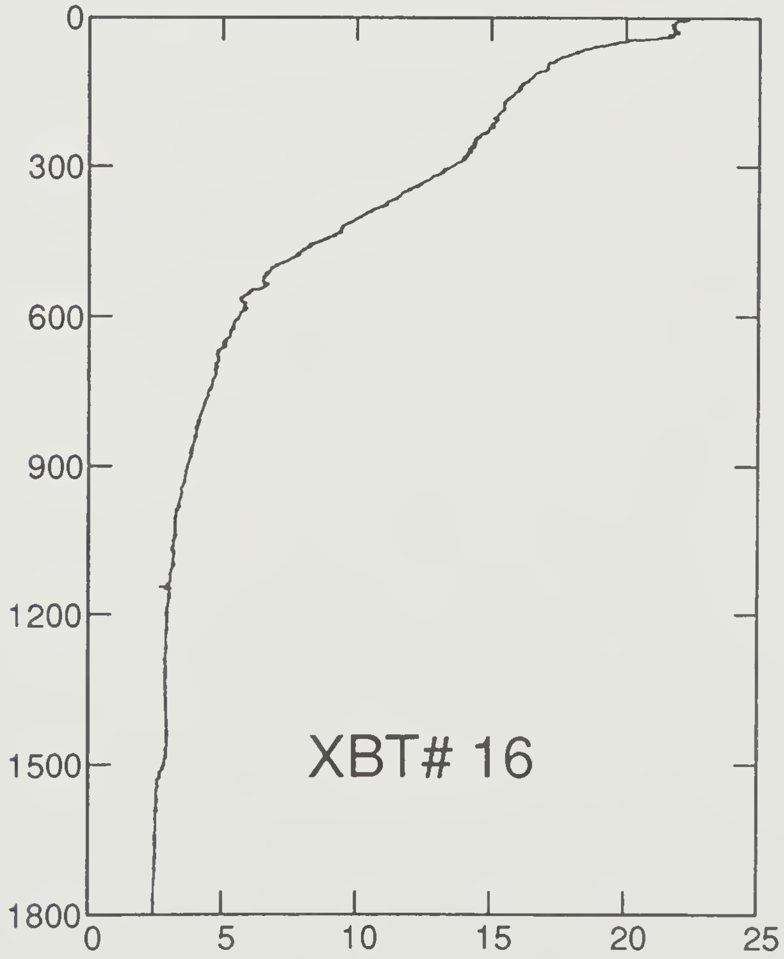
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10
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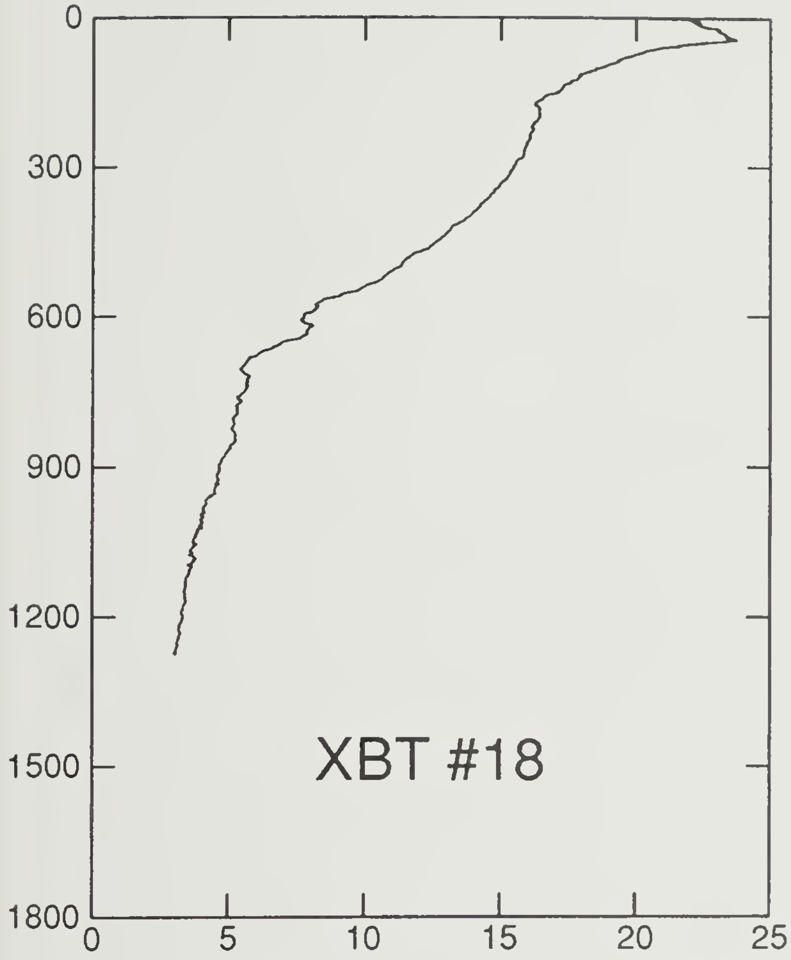
20
25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300
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1500
1800
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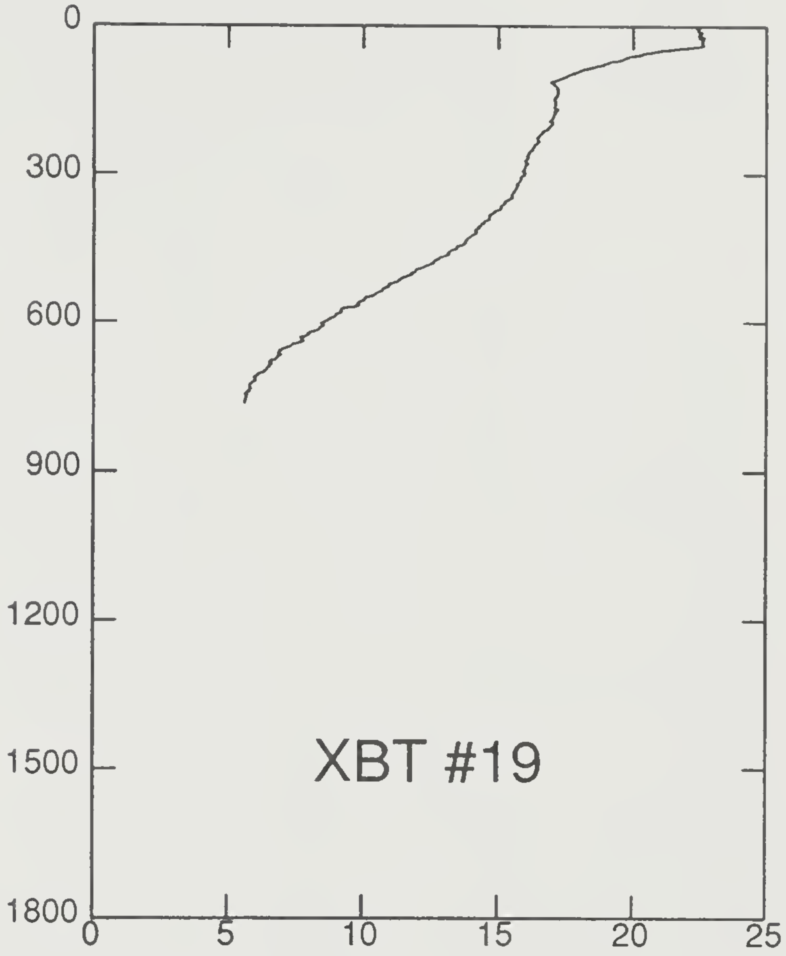
5
10
15
20
25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1500
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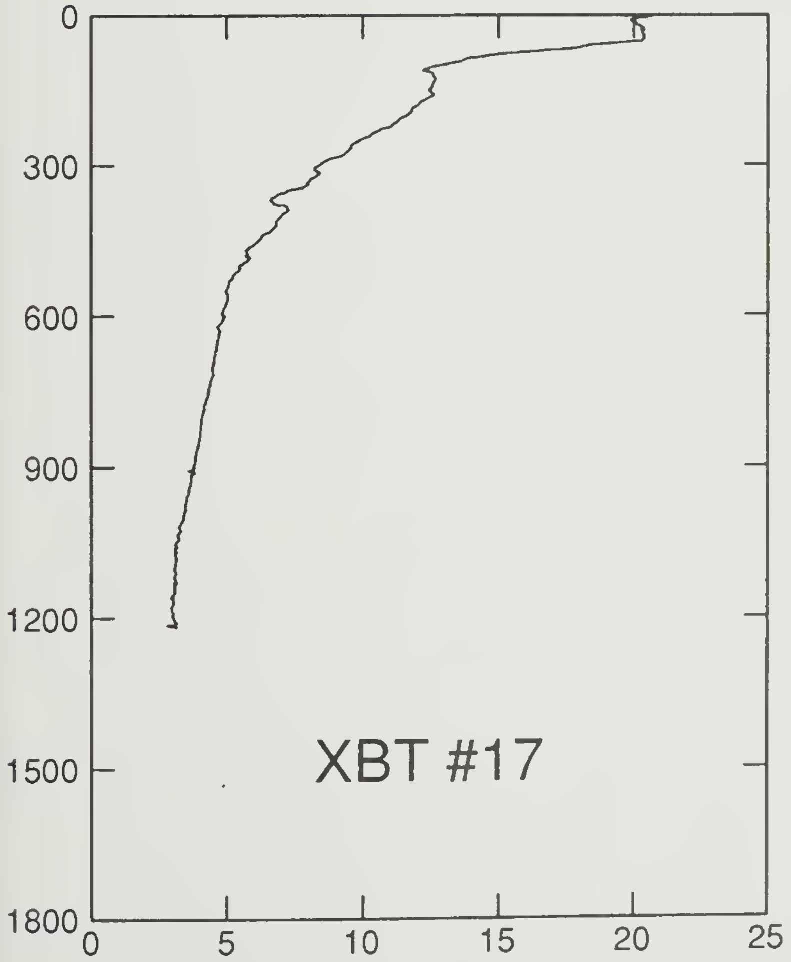
10
15
20
25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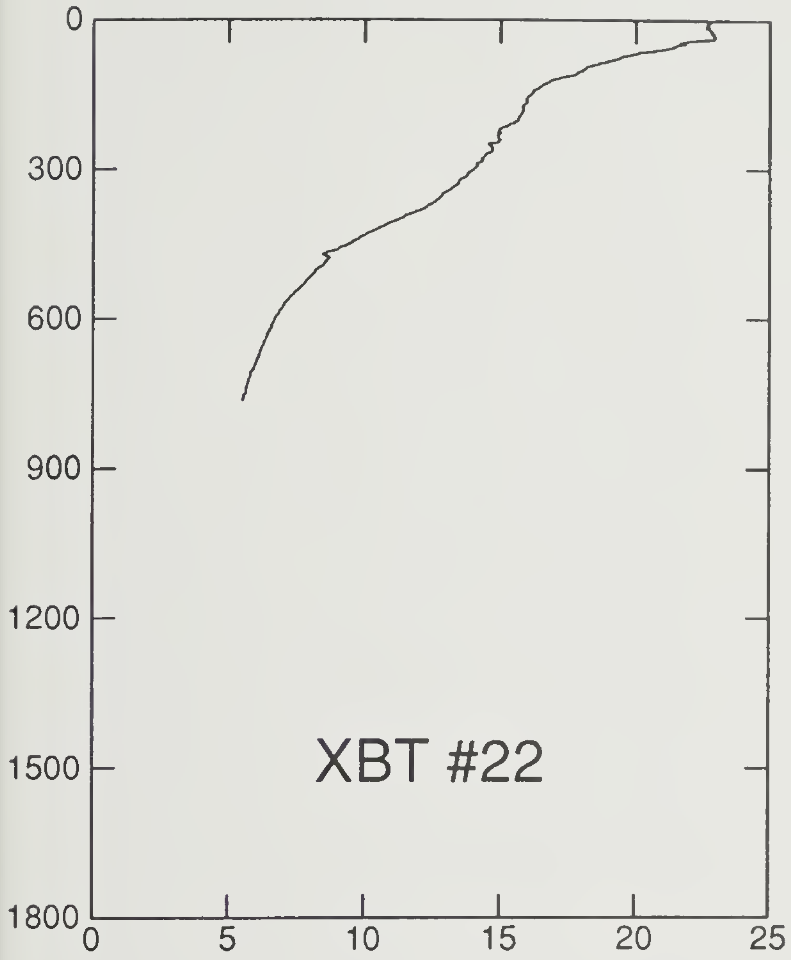
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10
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20
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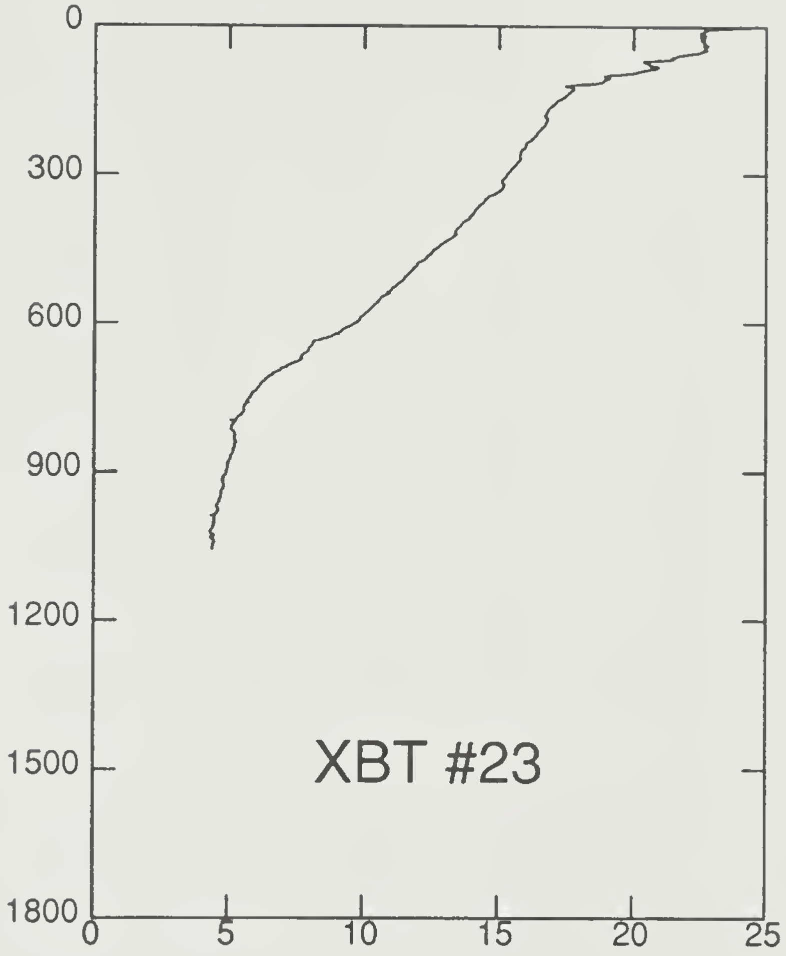
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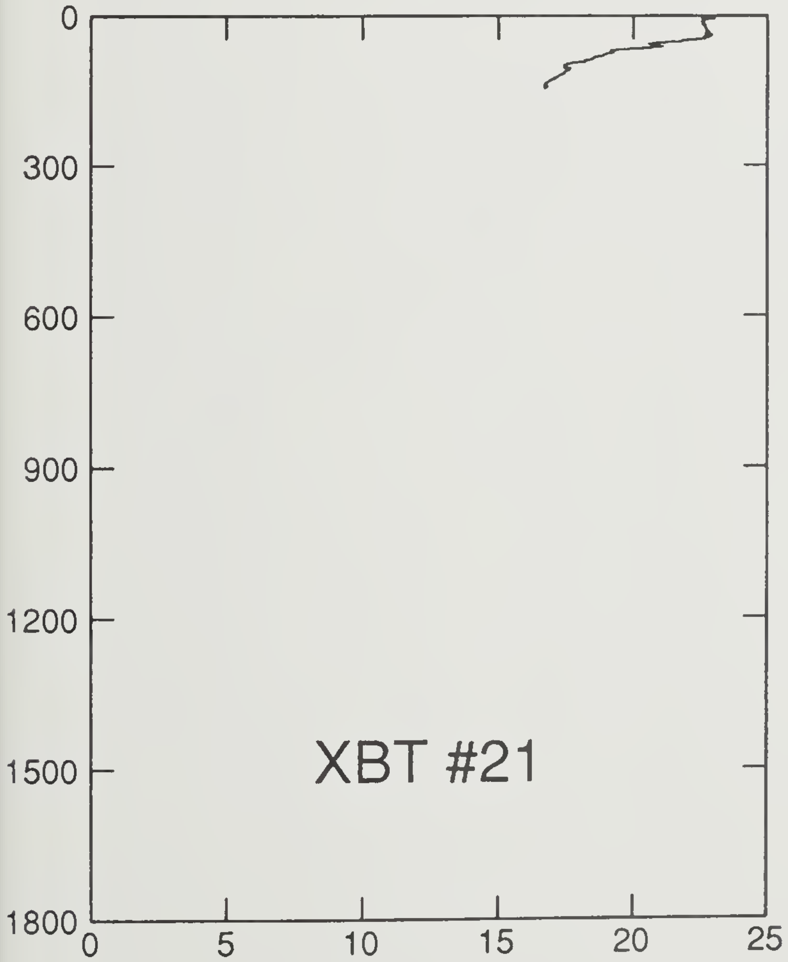
10
15
20
25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600
900
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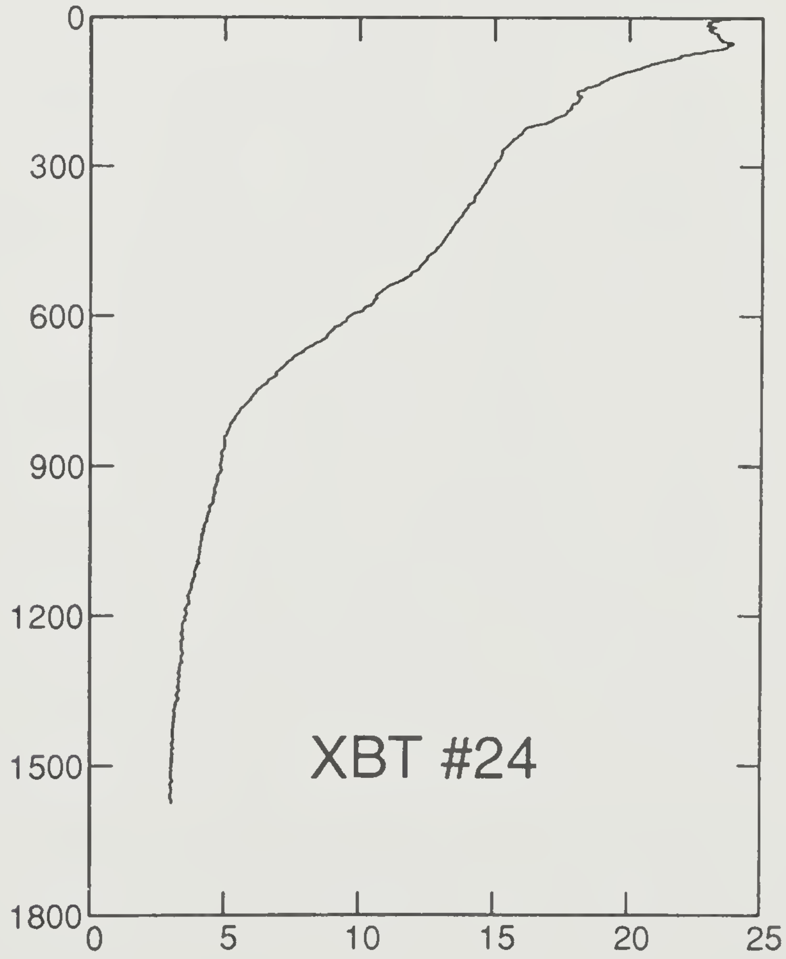
1500
1800
0
5
10
15
20
25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300
600
900
1200
1500
1800
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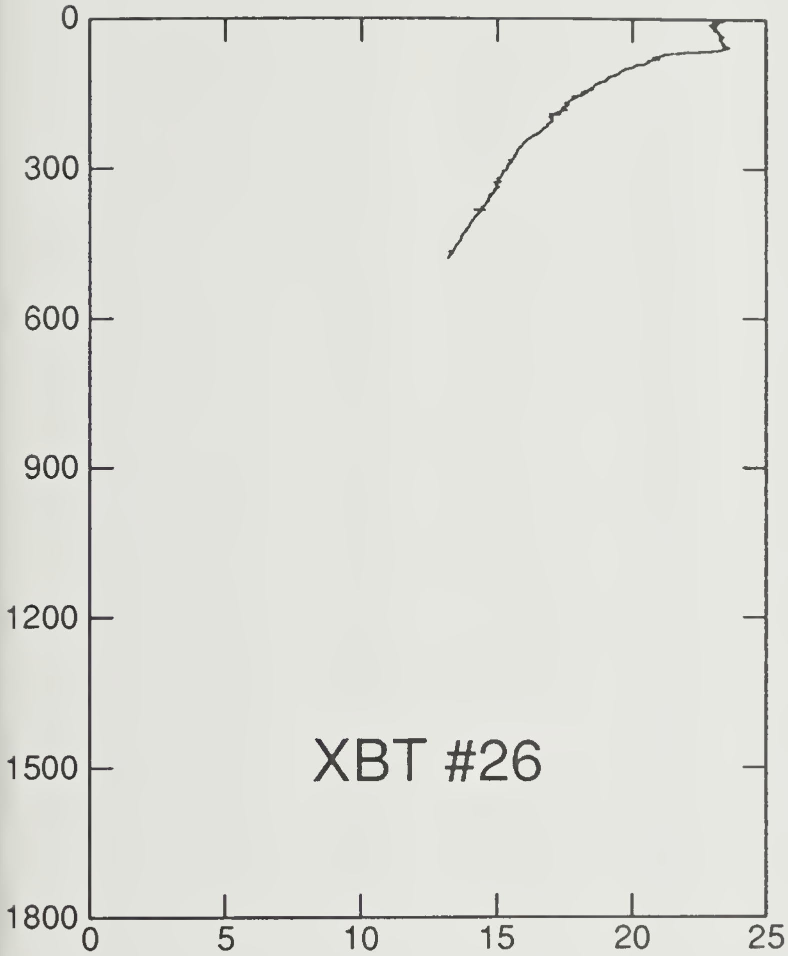
5
10
15
20
25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1500
1800
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20
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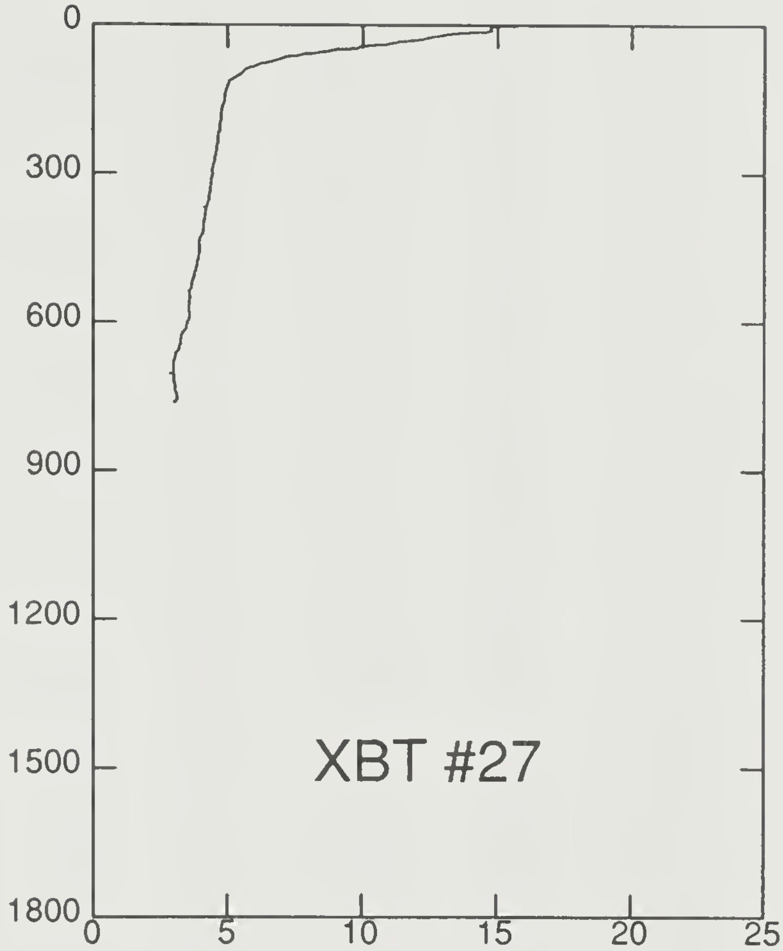
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1500
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10
15
20
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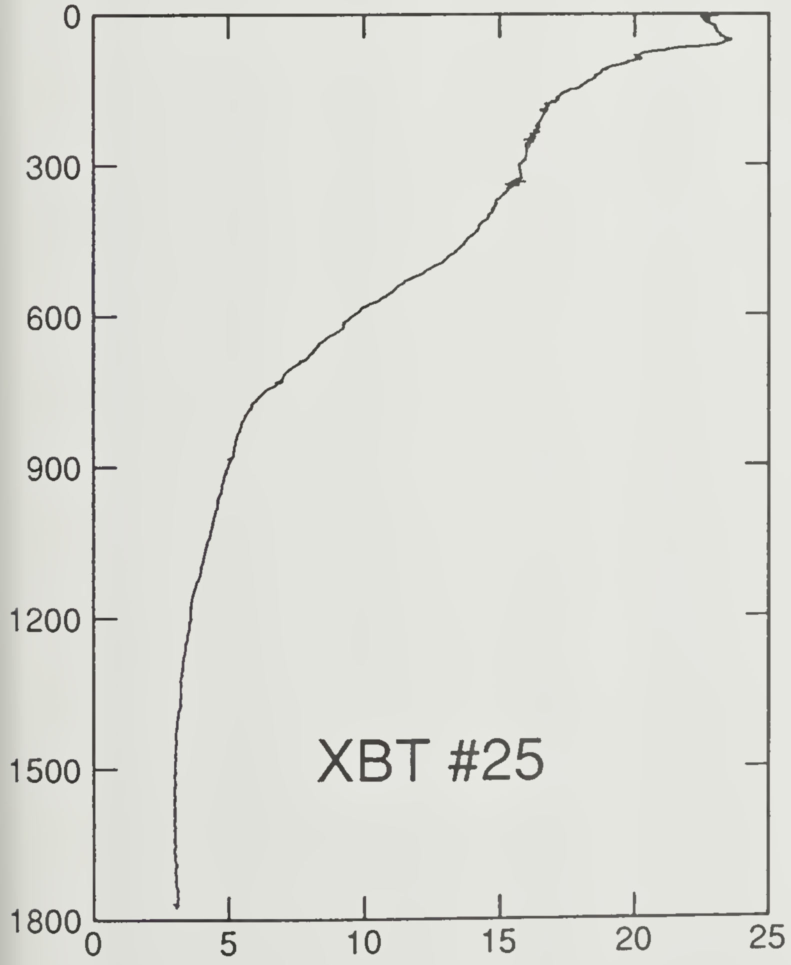
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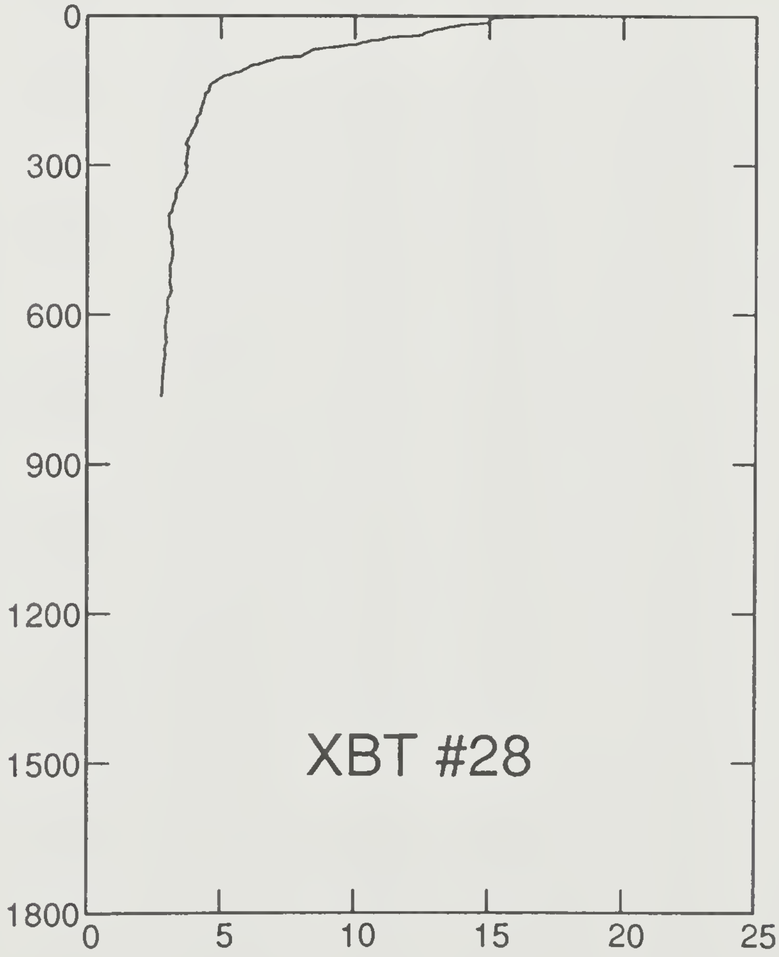
15
20
25


XBT #28
0
300
600
900
1200
1500
1800
0
5
10
15
20
25

XBT Temperatures

DEPTH	01	02b	03b	04	05	06	07	08	09	10b
0	25.6	18.5	24.5	26.9	-	25.0	26.8	16.3	24.6	23.5
10	23.7	23.4	22.8	22.4	22.8	24.8	24.3	23.8	24.2	22.4
20	23.9	23.4	22.9	22.3	22.9	24.0	24.4	23.7	24.4	22.4
30	23.9	23.6	23.1	22.5	23.0	24.4	24.5	23.7	24.6	22.5
40	23.7	23.6	22.1	22.8	22.2	23.9	24.4	23.7	24.6	22.6
50	22.1	22.4	22.4	20.9	19.9	22.6	24.3	21.9	24.5	22.4
60	21.4	20.9	21.4	20.1	18.3	22.2	22.3	21.9	23.7	21.0
70	20.7	20.0	20.8	19.6	17.2	21.1	22.0	21.7	23.0	20.2
80	19.6	18.5	20.1	19.3	17.1	20.1	21.8	21.8	22.5	19.6
90	19.1	17.8	19.3	18.8	16.7	19.4	21.8	21.7	21.9	19.0
100	18.3	17.7	18.3	18.4	16.1	18.8	21.6	21.6	21.7	18.6
110	17.7	17.5	17.8	18.0	15.8	18.3	21.5	21.5	21.5	18.2
120	17.3	17.1	17.1	17.6	15.6	18.0	21.0	21.5	21.1	17.8
130	17.2	16.8	16.8	17.2	15.3	17.7	20.5	21.5	20.6	17.6
140	17.0	16.6	16.6	16.9	15.2	17.5	19.8	21.3	20.0	17.6
150	17.0	16.5	16.2	16.6	15.2	16.9	19.3	20.6	19.5	17.4
160	16.8	16.6	16.0	16.4	15.6	17.0	19.0	19.9	18.9	17.3
170	16.3	16.5	15.8	16.4	15.6	16.5	18.8	19.5	18.5	17.0
180	15.9	16.4	15.8	16.2	15.4	16.3	18.3	19.2	18.1	16.8
190	15.6	16.0	15.7	15.9	15.1	16.2	17.8	19.1	17.7	16.5
200	15.4	15.6	15.6	15.8	14.8	16.0	17.5	18.6	17.5	16.3
210	15.4	15.3	15.5	15.6	14.7	15.7	17.2	18.5	17.1	16.0
220	15.4	15.2	15.5	15.7	14.6	15.3	17.2	18.2	16.9	15.8
230	15.3	15.1	15.4	15.5	14.5	15.2	17.1	17.9	16.8	15.7
240	15.3	15.2	15.2	15.4	14.3	14.8	16.9	17.2	16.4	15.7
250	15.2	15.0	15.2	15.4	14.2	14.7	16.6	16.9	16.3	15.8
260	15.0	14.8	15.1	15.2	13.8	14.7	16.4	16.8	16.2	15.5
270	14.8	14.5	15.0	14.9	13.7	14.3	16.4	17.1	16.1	15.5
280	14.6	14.2	14.9	14.7	13.6	14.2	15.9	16.9	16.0	15.4
290	14.4	14.1	14.9	14.6	13.3	14.0	15.4	16.8	15.6	15.4
300	14.2	14.0	14.8	14.4	13.0	13.8	15.2	16.5	15.2	15.2
310	14.1	13.8	14.7	14.3	12.7	13.7	15.1	16.4	15.1	15.1
320	13.9	13.8	14.5	14.2	12.4	13.6	15.0	16.2	15.1	15.0
330	13.7	13.6	14.3	14.0	12.1	13.4	15.3	15.6	14.9	15.0
340	13.5	13.5	14.0	13.8	11.8	13.3	15.1	15.4	14.8	14.7
350	13.3	13.4	13.8	13.7	11.6	13.1	15.0	15.3	14.6	14.5
360	13.1	13.2	13.5	13.6	11.4	12.9	14.7	15.3	14.5	14.5
370	13.0	13.0	13.3	13.4	11.1	12.7	14.6	15.4	14.3	14.2
380	12.5	12.7	13.0	13.1	10.8	12.3	14.3	15.4	14.3	14.1
390	12.2	12.6	12.7	12.9	10.5	11.9	14.1	15.3	14.1	13.9
400	12.0	12.4	12.4	12.5	10.1	11.6	13.9	15.2	14.0	13.7
410	11.8	12.1	12.0	12.3	9.7	11.3	13.8	14.9	14.0	13.5
420	11.3	11.8	11.9	12.1	9.6	10.9	13.6	14.7	13.7	13.4
430	11.0	11.5	11.7	11.8	9.3	10.6	13.6	14.4	13.6	13.0
440	10.9	11.1	11.4	11.8	8.9	10.2	13.5	14.3	13.5	12.8
450	10.6	10.7	11.1	11.2	8.7	10.0	13.3	14.0	13.4	12.5
460	10.1	10.4	10.9	10.9	8.2	9.7	13.1	13.5	13.2	12.3
470	10.0	10.2	10.4	10.8	8.0	9.6	12.9	13.5	13.1	11.9
480	9.7	9.8	10.1	10.5	7.8	9.2	12.8	13.1	12.9	11.7
490	9.4	9.3	9.8	10.3	7.5	8.9	12.5	13.0	12.7	11.4
500	9.1	9.1	9.3	9.9	7.5	8.6	12.3	13.0	12.5	11.1
510	8.9	9.4	9.0	9.6	7.1	8.2	12.1	12.9	12.4	10.7
520	8.6	9.2	8.7	9.3	7.1	8.1	11.9	12.7	12.2	10.5
530	8.4	9.1	8.4	8.9	7.0	7.8	11.7	12.5	11.9	10.1
540	8.4	8.8	8.2	8.6	6.8	7.7	11.3	12.3	11.7	9.6
550	8.0	8.6	7.8	8.3	6.6	7.4	11.2	12.0	11.5	9.3
560	7.9	8.3	7.8	8.1	6.3	7.1	10.7	11.8	11.1	8.8
570	7.7	8.1	7.4	7.7	6.2	7.0	10.5	11.6	10.9	8.7
580	7.5	7.9	7.2	7.6	6.1	6.7	10.2	11.2	10.6	8.3
590	7.3	7.6	7.0	7.4	6.0	6.6	10.1	11.1	10.3	7.5
600	7.1	7.4	7.2	7.1	5.8	6.5	9.9	10.8	10.2	7.0
610	6.8	7.4	7.3	6.6	5.8	6.2	9.6	10.7	10.0	6.8

XBT Temperatures

DEPTH	01	02b	03b	04	05	06	07	08	09	10b
620	6.7	7.2	7.2	6.8	5.7	6.1	9.2	10.4	9.9	6.6
630	6.5	7.0	7.1	6.6	5.6	5.9	9.1	10.2	9.7	6.6
640	6.3	6.9	6.8	6.1	5.5	5.8	9.0	10.1	9.5	6.0
650	6.2	6.7	6.6	6.0	5.4	5.7	8.9	9.9	9.2	6.1
660	6.2	6.5	6.3	5.8	5.4	5.5	8.6	9.8	8.9	
670	6.0	6.1	6.2	5.8	5.3	5.4	8.3	9.4	8.8	
680	5.8	6.1	6.0	5.8	5.2	5.3	8.2	9.2	8.7	
690	5.7	6.0	5.8	5.8	5.2	5.1	7.9	9.0	8.4	
700	5.4	5.9	5.7	5.6	5.1	5.3	7.9	8.8	8.0	
710	5.4	5.8	5.5	5.6	5.0	5.2	7.6	8.5	7.8	
720	5.3	5.7	5.5	5.5	5.0	5.2	7.3	8.3	7.7	
730	5.2	5.6	5.5	5.3	4.9	5.1	7.1	8.0	7.6	
740	5.1	5.5	5.3	5.2	4.9	5.2	7.0	7.8	7.5	
750	5.1	5.5	5.2	5.2	4.9	4.8	6.8	7.6	7.2	
760	5.1	5.3	5.1	5.1	4.8	4.8	6.4	7.5	7.1	
770				5.0	4.7	4.7	6.4	7.4	6.8	
780				4.8	4.6	4.7	6.4	7.3	6.7	
790				4.8	4.6	4.6	6.1	7.0	6.5	
800				4.8	4.6	4.6	5.9	6.9	6.3	
810				4.7	4.5	4.6	5.7	6.8	6.2	
820				4.8	4.4	4.4	5.6	6.6	6.1	
830				4.7	4.4	4.6	5.5	6.5	5.9	
840				4.8	4.3	4.4	5.5	6.4	5.9	
850				4.7	4.2	4.3	5.4	6.2	5.8	
860				4.7	4.3	4.3	5.4	6.0	5.6	
870				4.5	4.2	4.2	5.3	5.8	5.7	
880				4.5	4.1	4.1	5.2	5.6	5.6	
890				4.4	4.1	4.2	5.2	5.4	5.6	
900				4.3	3.9	4.2	5.1	5.3	5.5	
910				4.2	3.9	4.1	5.0	5.3	5.4	
920				4.1	3.9	4.1	5.0	5.3	5.2	
930				4.1	3.9	4.1	4.9	5.2	5.0	
940				4.1	3.7	4.0	4.8	5.1	5.0	
950				4.1	3.7	3.8	4.8	5.0	5.0	
960				4.1	3.7	3.9	4.7	5.0	4.8	
970				3.9	3.6	3.8	4.6	5.0	4.6	
980				3.9	3.6	3.8	4.6	5.0	4.5	
990				3.9	3.6	3.8	4.6	5.0	4.5	
1000				3.9	3.5	3.6	4.6	5.0	4.4	
1010				3.7	3.5	3.6	4.5	4.9	4.4	
1020				3.7	3.5	4.0	4.5	4.8	4.3	
1030				3.6	3.5	3.6	4.4	4.8	4.2	
1040				3.6	3.6	3.5	4.3	4.7	4.2	
1050				3.7	3.6	3.3	4.3	4.7	4.1	
1060				3.4	3.6	3.4	4.2	4.7	4.1	
1070				3.5	3.5	3.4	4.2	4.6	4.0	
1080				3.5	3.4	3.6	4.1	4.5	4.0	
1090				3.4	3.5	3.2	4.1	4.4	3.9	
1100				3.4	3.5	3.2	4.0	4.4	3.8	
1110				3.5	3.4	3.0	4.0	4.3	3.8	
1120				3.4	3.3	3.3	4.0	4.2	3.8	
1130				3.4	3.3	3.3	3.9	4.1	3.7	
1140				3.4	3.2	3.3	3.9	4.1	3.7	
1150				3.4	3.3	3.3	3.9	4.0	3.6	
1160				3.4	3.3	3.1	3.8	3.9	3.6	
1170				3.3	3.2	3.4	3.8	3.8	3.6	
1180				3.3	3.1	3.1	3.7	3.8	3.5	
1190				3.3	3.2	3.1	3.7	3.8	3.4	
1200				3.2	3.0	3.2	3.8	3.8	3.4	
1210				3.1		3.3	3.7	3.8	3.2	
1220				3.1		3.1	3.7	3.8	3.4	
1230				3.1		3.4	3.6	3.7	3.4	

XBT Temperatures

DEPTH	01	02b	03b	04	05	06	07	08	09	10b
1240				3.1		3.4	3.6	3.7	3.4	
1250				3.1		3.0	3.5	3.7	3.4	
1260				3.1			3.5	3.7	3.4	
1270				3.1			3.5	3.6	3.3	
1280				3.1			3.4	3.6	3.3	
1290				3.1			3.4	3.6	3.2	
1300				3.0			3.4	3.6	3.2	
1310				3.0			3.4	3.6	3.1	
1320				3.2			3.3	3.5	3.1	
1330				2.7				3.4	3.1	
1340								3.4	3.0	
1350								3.4	3.0	
1360								3.4	3.0	
1370								3.3	3.0	
1380								3.3	3.0	
1390								3.3	3.0	
1400								3.3	3.0	
1410								3.3	3.0	
1420								3.4	3.0	
1430								3.3	3.0	
1440								3.3	3.0	
1450								3.3	3.0	
1460								3.3	3.0	
1470								3.2	3.0	
1480								3.2	3.0	
1490								3.1	3.0	
1500								3.0	3.0	
1510								3.0	3.1	
1520								3.0	3.1	
1530								3.0	3.1	
1540								3.0	3.1	
1550								3.0	3.1	
1560								3.0	3.2	
1570								2.9	3.2	
1580								3.0	3.1	
1590								3.0	3.1	
1600								3.0	3.1	
1610								3.0	3.1	
1620								3.0	3.0	
1630								3.0	3.1	
1640								3.0	3.0	
1650								3.0	3.0	
1660								3.0	3.1	
1670								3.0	3.2	
1680								3.0	3.2	
1690								3.0	3.2	
1700								2.9	3.2	
1710								2.9	3.2	
1720								3.0	3.2	
1730								3.0	3.2	
1740								3.0	3.3	
1750								3.0	3.3	
1760								3.0	3.4	
1770								3.0	3.4	
1780								3.0	3.4	
1790								3.0	3.4	
1800								3.0	3.4	
1810								3.0	3.2	
1820								3.1	3.2	
1830								3.0	3.3	

XBT Temperatures

DEPTH	11	12	13	14	15	16	17	18	19
0	23.0	22.4	22.5	22.9	22.3	-	19.5	20.3	-
10	21.0	22.0	21.8	23.0	22.6	21.8	19.9	22.2	22.5
20	21.5	22.1	22.0	22.7	22.7	21.7	20.1	22.8	22.4
30	22.3	22.4	22.2	22.6	22.8	22.0	20.4	23.2	22.6
40	22.9	23.0	22.3	21.0	20.9	21.3	20.4	23.5	22.6
50	21.4	21.5	22.1	20.8	20.6	19.7	20.3	22.5	21.0
60	19.9	20.6	21.2	19.5	19.5	18.8	18.4	21.0	20.1
70	19.1	20.3	20.6	18.9	18.6	18.1	17.0	20.3	19.4
80	19.1	19.7	19.9	18.5	18.0	17.6	14.7	19.6	18.7
90	18.7	18.5	19.0	17.8	17.8	17.3	13.7	19.2	18.0
100	18.2	17.4	18.1	17.6	17.3	17.1	12.9	18.7	17.6
110	17.8	17.1	16.0	16.9	16.9	16.8	12.2	18.2	17.1
120	17.6	17.0	15.4	16.7	16.6	16.5	12.6	17.9	17.1
130	16.5	16.4	15.7	16.5	16.4	16.4	12.7	17.6	17.2
140	16.7	16.1	15.6	16.2	16.4	16.1	12.6	17.3	17.2
150	16.6	16.1	16.2	16.1	16.3	16.0	12.4	17.1	17.1
160	16.4	15.8	15.9	16.2	16.0	15.7	12.6	16.5	17.1
170	16.3	15.6	15.7	15.8	16.1	15.5	12.2	16.3	17.2
180	16.2	15.4	15.5	15.9	16.0	15.5	12.0	16.4	17.1
190	16.4	15.4	15.2	15.9	15.8	15.4	11.8	16.4	17.0
200	16.0	15.2	15.0	15.7	15.7	15.3	11.6	16.4	17.0
210	16.0	14.9	14.8	15.6	15.6	15.2	11.3	16.2	16.8
220	15.9	14.6	14.6	15.5	15.4	15.1	11.1	16.1	16.5
230	15.8	14.7	14.6	15.4	15.1	14.8	10.6	16.1	16.5
240	15.7	14.6	14.5	15.2	14.9	14.5	10.3	16.1	16.3
250	15.6	14.5	14.4	15.2	14.8	14.4	9.9	16.0	16.2
260	15.6	14.2	14.3	15.1	14.7	14.3	9.6	15.9	16.1
270	15.4	13.9	14.1	14.9	14.5	14.2	9.5	15.8	16.0
280	15.2	13.7	13.9	14.7	14.6	14.0	9.3	15.8	16.0
290	15.3	13.4	13.7	14.7	14.3	13.9	8.7	15.6	15.9
300	14.9	13.2	13.4	14.5	14.1	13.5	8.4	15.5	16.0
310	14.8	13.0	13.3	14.3	13.9	13.2	8.3	15.3	15.8
320	14.5	12.7	13.0	14.3	13.7	12.8	8.3	15.2	15.7
330	14.3	12.6	12.5	14.1	13.5	12.5	8.1	15.0	15.7
340	14.0	12.3	12.0	13.9	13.3	12.2	7.9	14.9	15.5
350	13.2	11.9	11.7	13.6	13.1	11.8	7.2	14.7	15.4
360	13.2	11.6	11.3	13.1	12.8	11.5	6.9	14.6	15.2
370	13.2	11.1	10.6	12.8	12.5	11.3	6.6	14.3	15.1
380	12.9	11.0	10.4	12.4	12.3	10.9	7.2	14.2	14.7
390	12.9	10.8	10.2	12.2	11.9	10.5	7.3	14.0	14.7
400	12.7	10.6	9.8	11.9	11.6	10.2	7.0	13.8	14.4
410	12.3	10.3	9.2	11.6	11.4	9.9	6.9	13.5	14.2
420	12.1	9.9	9.0	11.1	11.2	9.5	6.8	13.2	14.1
430	11.8	9.7	8.6	10.9	10.8	9.4	6.6	13.0	13.8
440	11.4	9.1	7.9	10.6	10.5	9.2	6.3	12.8	13.7
450	11.0	8.3	7.7	10.3	10.2	8.6	6.2	12.6	13.4
460	10.9	8.2	7.5	9.9	10.0	8.2	6.0	12.4	13.2
470	10.6	8.1	7.3	9.6	9.3	8.0	5.7	12.0	12.8
480	10.3	7.7	6.8	9.4	9.2	7.7	5.7	11.6	12.5
490	9.7	7.5	6.7	9.0	8.9	7.4	5.8	11.4	12.1
500	9.3	7.2	6.5	8.7	8.5	7.0	5.5	11.3	11.8
510	8.4	7.1	6.4	8.6	8.3	6.8	5.4	10.9	11.4
520	8.2	6.9	6.2	8.3	7.9	6.6	5.2	10.7	11.0
530	7.6	6.8	5.9	8.1	7.6	6.5	5.1	10.4	10.8
540	7.6	6.4	5.8	7.9	7.3	6.6	5.1	10.0	10.5
550	7.9	6.4	5.7	7.5	7.1	6.0	5.0	9.6	10.1
560	7.8	6.2	5.7	7.2	7.1	5.7	5.1	9.0	9.8
570	7.7	6.0	5.7	7.0	6.9	5.7	5.0	8.4	9.4
580	7.3	5.9	5.7	6.7	6.8	5.8	4.9	8.3	9.2
590	7.1	5.7	5.6	6.6	6.5	5.7	4.9	8.1	8.8
600	6.9	5.6	5.5	6.3	6.3	5.6	4.9	7.8	8.6
610	6.7	5.4	5.3	6.1	6.2	5.4	4.8	7.7	8.4

XBT Temperatures

DEPTH	11	12	13	14	15	16	17	18	19
620	6.5	5.5	5.4	5.9	6.0	5.4	4.7	8.1	8.0
630	6.3	5.6	5.3	5.9	5.5	5.3	4.8	7.9	7.7
640	6.2	5.4	5.0	5.7	5.2	5.3	4.7	7.7	7.6
650	6.0	5.4	4.8	5.6	5.1	5.1	4.7	7.0	7.2
660	5.8	5.3	4.8	5.6	5.0	5.1	4.6	6.7	6.9
670	5.8	5.2	4.9	5.5	5.0	4.8	4.6	6.2	6.8
680	5.4	5.1	4.8	5.4	5.1	4.8	4.6	5.9	6.5
690	5.3	5.0	4.8	5.3	5.6	4.9	4.5	5.7	6.5
700	5.2	5.0	4.8	5.2	5.5	4.8	4.5	5.5	6.3
710	5.1	4.9	5.1	5.1	5.4	4.8	4.5	5.5	6.0
720	5.3	4.8	4.7	5.0	5.5	4.7	4.5	5.8	5.9
730	5.3	4.8	4.6	5.0	5.4	4.6	4.4	5.7	5.8
740	5.2	4.8	4.6	4.9	5.3	4.6	4.4	5.7	5.8
750	5.2	4.7	4.5	5.0	5.1	4.5	4.3	5.6	5.6
760	5.1	4.8	4.6	4.7	5.1	4.5	4.3	5.3	5.6
770	5.2	4.8	4.4	4.7	5.0	4.3	4.3	5.5	
780	5.1	4.8	4.3	4.6	4.9	4.3	4.2	5.3	
790	5.0	4.7	4.3	4.6	4.8	4.2	4.2	5.3	
800	4.9	4.7	4.4	4.5	4.7	4.2	4.1	5.2	
810	4.8	4.6	4.3	4.4	4.6	4.1	4.1	5.2	
820	4.7	4.5	4.2	4.3	4.5	4.0	4.1	5.1	
830	4.7	4.5	4.2	4.3	4.5	4.0	4.0	5.2	
840	4.8	4.4	4.2	4.3	4.4	4.1	4.0	5.2	
850	4.6	4.4	4.1	4.2	4.2	3.9	4.0	5.2	
860	4.6	4.4	4.0	4.2	4.2	3.9	4.0	5.1	
870	4.6	4.3	4.0	4.1	4.2	3.9	3.9	5.0	
880	4.5	4.2	3.9	4.1	4.1	3.8	3.9	4.8	
890	4.5	4.2	3.9	4.0	4.0	3.8	3.9	4.7	
900	4.4	4.1	3.8	4.1	3.9	3.7	3.8	4.7	
910	4.3	4.1	4.0	4.0	3.9	3.6	3.8	4.7	
920	4.3	4.2	3.9	4.0	3.8	3.6	3.7	4.6	
930	4.3	4.1	3.8	4.0	3.9	3.6	3.7	4.6	
940	4.2	4.0	3.8	3.9	3.8	3.5	3.6	4.5	
950	4.1	4.0	3.8	3.8	3.7	3.5	3.6	4.5	
960	4.0	3.9	3.7	3.8	3.5	3.5	3.5	4.3	
970	4.0	3.9	3.8	3.8	3.7	3.4	3.5	4.2	
980	4.0	3.9	3.7	3.9	3.6	3.4	3.5	4.1	
990	3.9	3.9	3.7	3.7	3.5	3.3	3.5	4.1	
1000	3.9	3.7	3.5	3.7	3.5	3.3	3.4	4.1	
1010	3.8	3.7	3.4	3.7	3.4	3.3	3.3	4.1	
1020	3.7	3.6	3.4	3.6	3.4	3.2	3.3	4.0	
1030	3.7	3.4	3.3	3.6	3.5	3.3	3.2	3.9	
1040	3.7	3.3	3.4	3.5	3.3	3.2	3.2	3.8	
1050	3.6	3.3	3.5	3.4	3.3	3.2	3.1	3.7	
1060	3.6	3.2	3.5	3.6	3.3	3.2	3.1	3.7	
1070	3.5	3.2	3.3	3.4	3.4	3.1	3.1	3.7	
1080	3.6	3.2	3.3	3.5	3.3	3.2	3.1	3.7	
1090	3.5	3.2	3.2	3.5	3.2	3.1	3.1	3.7	
1100	3.5	3.2	3.2	3.3	3.1	3.2	3.1	3.7	
1110	3.4	3.2	3.1	3.4	3.2	3.1	3.1	3.6	
1120	3.4	3.2	3.4	3.3	3.2	3.1	3.1	3.5	
1130	3.3	3.2	3.2	3.3	3.2	3.1	3.2	3.4	
1140	3.3	3.2	3.2	3.3	3.2	3.0	3.1	3.4	
1150	3.2	3.2	3.4	3.2	3.1	3.0	3.1	3.4	
1160	3.2	3.1	3.2	3.2	3.1	3.0	3.0	3.4	
1170	3.2	3.1	3.1	3.1	3.1	3.0	3.1	3.4	
1180	3.1	3.1	3.1	3.2	3.0	3.0	3.0	3.3	
1190	3.2	3.1	3.1	3.2	3.0	2.9	3.0	3.3	
1200	3.2	3.1	3.1	3.1	3.0	2.9	3.1	3.4	
1210	3.1	3.1	3.1	3.2	3.0	2.9	3.1	3.3	
1220	3.1	2.9	2.9	3.0	3.0	2.9		3.2	
1230	3.1	2.9	3.0	3.1	3.0	2.9		3.2	

XBT Temperatures

DEPTH	11	12	13	14	15	16	17	18	19
1240	3.1	2.8	3.0	3.0	3.0	2.9		3.2	
1250	3.0	2.9	2.9	3.1	2.9	2.9		3.1	
1260	3.0	2.8		3.1	2.9	2.9		3.1	
1270	3.0	2.9		3.2	2.9	2.9		3.1	
1280	2.9	3.0			2.7	2.9			
1290	2.8	2.9			2.9	2.9			
1300		2.3				2.9			
1310						2.9			
1320						2.9			
1330						2.9			
1340						2.9			
1350						2.9			
1360						2.9			
1370						2.9			
1380						2.9			
1390						2.9			
1400						2.9			
1410						2.9			
1420						2.9			
1430						2.9			
1440						2.9			
1450						2.9			
1460						3.0			
1470						3.0			
1480						2.9			
1490						2.9			
1500						2.9			
1510						2.8			
1520						2.7			
1530						2.6			
1540						2.6			
1550						2.6			
1560						2.6			
1570						2.5			
1580						2.6			
1590						2.5			
1600						2.5			
1610						2.5			
1620						2.5			
1630						2.5			
1640						2.5			
1650						2.5			
1660						2.5			
1670						2.5			
1680						2.5			
1690						2.5			
1700						2.5			
1710						2.5			
1720						2.5			
1730						2.5			
1740						2.5			
1750						2.5			
1760						2.5			
1770						2.5			
1780						2.5			
1790						2.5			
1800						2.5			
1810						2.5			
1820						2.5			
1830						2.5			

XBT Temperatures

DEPTH	21	22	23	24	25	26	27	28
0	2.2	-	31.2	23.8	22.9	10.8	-	-
10	22.6	22.6	22.6	23.0	22.8	23.0	14.8	15.0
20	22.6	22.8	22.7	23.1	22.9	23.1	13.0	13.9
30	22.7	23.0	22.7	23.2	23.0	23.2	12.0	12.9
40	22.9	22.4	22.7	23.3	23.2	23.3	10.7	12.1
50	21.8	21.5	22.5	23.9	23.5	23.4	8.9	10.6
60	21.0	20.8	21.6	23.6	23.2	23.4	7.7	9.6
70	19.2	19.7	20.4	22.5	21.3	21.3	6.8	8.3
80	18.8	19.1	20.9	21.8	20.2	21.0	6.1	8.0
90	18.2	18.4	20.2	21.0	20.2	20.4	5.6	6.8
100	17.4	18.0	18.9	20.4	19.5	19.7	5.4	6.1
110	17.6	17.7	18.9	19.8	19.0	19.5	5.1	5.8
120	17.2	16.9	17.5	19.3	18.7	19.0	5.0	5.1
130	16.9	16.6	17.7	18.9	18.4	18.7	4.9	4.8
140	16.7	16.3	17.5	18.4	18.1	18.5	4.9	4.6
150		16.1	17.1	18.1	17.6	18.2	4.9	4.5
160		15.9	17.0	18.2	17.3	17.8	4.8	4.4
170		15.9	16.8	18.1	17.1	17.6	4.8	4.4
180		15.8	16.7	17.8	16.7	17.4	4.8	4.3
190		15.8	16.8	17.7	16.6	17.1	4.7	4.2
200		15.7	16.7	17.3	16.6	17.0	4.7	4.2
210		15.3	16.5	17.0	16.5	16.9	4.7	4.1
220		15.0	16.3	16.2	16.4	16.7	4.7	4.0
230		14.9	16.2	16.0	16.2	16.5	4.6	3.9
240		15.0	16.0	15.9	16.1	16.1	4.6	3.8
250		14.6	15.8	15.6	16.2	15.9	4.6	3.8
260		14.7	15.8	15.4	16.0	15.8	4.6	3.7
270		14.4	15.8	15.3	16.0	15.7	4.5	3.8
280		14.3	15.6	15.2	16.0	15.6	4.5	3.7
290		14.1	15.4	15.1	16.0	15.4	4.4	3.7
300		14.0	15.3	15.0	15.7	15.4	4.5	3.7
310		13.8	15.1	14.9	15.7	15.2	4.4	3.7
320		13.5	15.2	14.8	15.8	15.0	4.4	3.7
330		13.4	15.1	14.7	15.6	15.0	4.4	3.6
340		13.1	14.8	14.5	15.3	14.9	4.3	3.5
350		12.9	14.5	14.4	15.3	14.8	4.3	3.4
360		12.7	14.3	14.2	15.1	14.7	4.3	3.3
370		12.4	14.1	14.3	14.9	14.5	4.2	3.3
380		12.1	14.0	14.0	14.9	14.4	4.2	3.2
390		11.6	13.8	13.9	14.8	14.3	4.1	3.2
400		11.2	13.6	13.8	14.6	14.1	4.1	3.0
410		10.8	13.4	13.6	14.5	14.0	4.1	3.1
420		10.4	13.4	13.5	14.2	13.9	4.1	3.1
430		10.0	13.1	13.4	14.2	13.7	4.0	3.1
440		9.7	12.8	13.2	14.0	13.6	3.9	3.2
450		9.4	12.6	13.1	13.8	13.5	4.0	3.2
460		9.0	12.4	13.0	13.6	13.4	3.9	3.2
470		8.4	12.2	12.8	13.4	13.3	3.9	3.2
480		8.6	12.0	12.5	13.2		3.9	3.2
490		8.5	11.8	12.4	13.0		3.8	3.2
500		8.2	11.6	12.2	12.6		3.8	3.1
510		8.1	11.5	12.0	12.3		3.7	3.1
520		7.9	11.2	11.8	12.0		3.7	3.1
530		7.8	11.0	11.5	11.5		3.6	3.1
540		7.6	10.8	11.1	11.3		3.6	3.1
550		7.4	10.6	10.8	11.1		3.6	3.1
560		7.2	10.4	10.6	10.8		3.6	3.1
570		7.0	10.2	10.5	10.5		3.6	3.0
580		6.9	10.0	10.3	10.1		3.6	3.0
590		6.8	9.9	10.1	9.8		3.6	3.0
600		6.7	9.6	9.6	9.6		3.5	3.0
610		6.6	9.3	9.5	9.3		3.5	2.9

XBT Temperatures

DEPTH	21	22	23	24	25	26	27	28
620		6.5	9.1	9.2	9.2		3.3	2.9
630		6.4	8.5	9.0	9.1		3.3	2.9
640		6.4	8.1	8.8	8.7		3.2	2.9
650		6.3	8.0	8.6	8.5		3.2	2.9
660		6.2	7.8	8.2	8.3		3.1	2.9
670		6.1	7.7	8.0	8.2		3.0	2.9
680		6.1	7.3	7.6	8.0		3.0	2.9
690		6.0	7.0	7.4	7.6		3.0	2.9
700		5.9	6.7	7.2	7.4		3.0	2.9
710		5.8	6.4	7.0	7.2		3.0	2.9
720		5.8	6.2	6.9	7.0		3.0	2.8
730		5.7	6.1	6.6	6.9		3.0	2.8
740		5.6	5.9	6.4	6.7		3.1	2.8
750		5.6	5.8	6.2	6.3		3.1	2.8
760		5.6	5.7	6.0	6.1		3.1	2.8
770			5.5	5.9	6.0			
780			5.5	5.8	5.9			
790			5.3	5.6	5.7			
800			5.2	5.4	5.6			
810			5.1	5.3	5.5			
820			5.2	5.2	5.5			
830			5.2	5.2	5.4			
840			5.3	5.1	5.3			
850			5.2	5.0	5.3			
860			5.2	5.0	5.2			
870			5.1	4.9	5.2			
880			5.0	4.9	5.2			
890			5.0	4.9	5.1			
900			4.9	4.8	5.0			
910			4.8	4.9	4.9			
920			4.8	4.7	4.8			
930			4.8	4.7	4.8			
940			4.7	4.7	4.8			
950			4.7	4.6	4.7			
960			4.7	4.6	4.7			
970			4.6	4.6	4.6			
980			4.6	4.5	4.6			
990			4.5	4.5	4.5			
1000			4.5	4.4	4.5			
1010			4.4	4.4	4.4			
1020			4.3	4.2	4.4			
1030			4.4	4.2	4.3			
1040			4.5	4.2	4.3			
1050			4.4	4.1	4.2			
1060				4.1	4.2			
1070				4.1	4.1			
1080				4.1	4.1			
1090				4.0	4.0			
1100				4.0	4.0			
1110				3.9	4.0			
1120				3.9	3.9			
1130				3.8	3.8			
1140				3.8	3.8			
1150				3.7	3.7			
1160				3.6	3.7			
1170				3.7	3.6			
1180				3.6	3.6			
1190				3.6	3.6			
1200				3.6	3.6			
1210				3.6	3.6			
1220				3.5	3.5			
1230				3.5	3.5			

XBT Temperatures

DEPTH	21	22	23	24	25	26	27	28
1240				3.5	3.5			
1250				3.4	3.4			
1260				3.4	3.4			
1270				3.4	3.4			
1280				3.4	3.3			
1290				3.4	3.3			
1300				3.4	3.3			
1310				3.3	3.3			
1320				3.3	3.2			
1330				3.3	3.2			
1340				3.3	3.2			
1350				3.3	3.2			
1360				3.2	3.2			
1370				3.3	3.2			
1380				3.2	3.2			
1390				3.1	3.1			
1400				3.2	3.1			
1410				3.1	3.1			
1420				3.1	3.1			
1430				3.1	3.0			
1440				3.1	3.1			
1450				3.1	3.1			
1460				3.0	3.0			
1470				3.0	3.0			
1480				3.1	3.1			
1490				3.1	3.0			
1500				3.1	3.0			
1510				3.0	3.0			
1520				3.0	3.0			
1530				3.1	3.0			
1540				3.0	3.0			
1550				3.0	3.0			
1560				3.0	3.0			
1570				3.1	3.0			
1580					3.0			
1590					3.0			
1600					3.0			
1610					3.0			
1620					3.0			
1630					3.0			
1640					3.0			
1650					3.0			
1660					3.0			
1670					3.0			
1680					3.0			
1690					3.1			
1700					3.0			
1710					3.0			
1720					3.0			
1730					3.1			
1740					3.1			
1750					3.1			
1760					3.1			
1770					3.1			
1780								
1790								
1800								
1810								
1820								
1830								

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